

ANC



POPULAR MECHANICS MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

REGD. TRADE MARK GREAT BRITAIN NO. 410426



BUILD YOUR OWN URANIUM DETECTOR - Page 238

Imagine
Dad
selling me
on a
Whizzer!



SAY, EDDIE, YOUR FRIEND BOB TELLS ME HE'S HAD A WHIZZER MOTOR PUT ON HIS BIKE



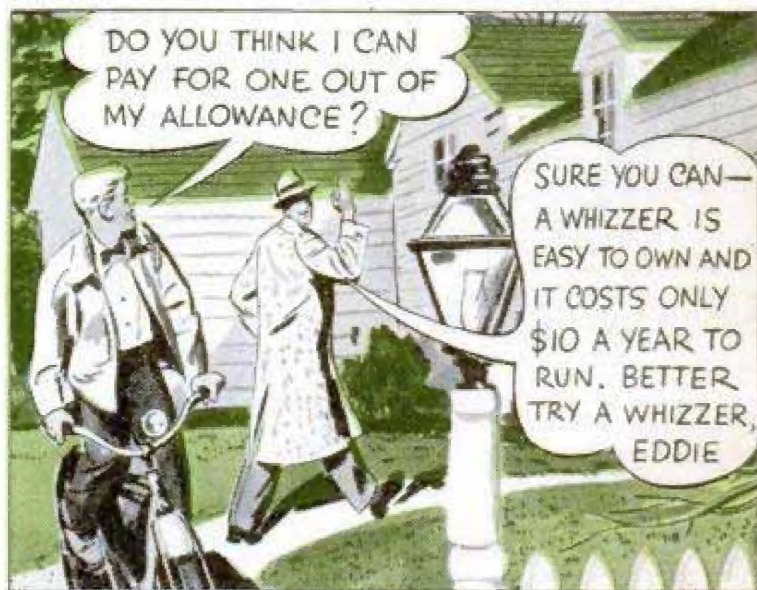
YEAH, NOT A BAD IDEA

NOT A BAD IDEA! LISTEN — HE GETS 125 MILES ON A GALLON OF GAS!



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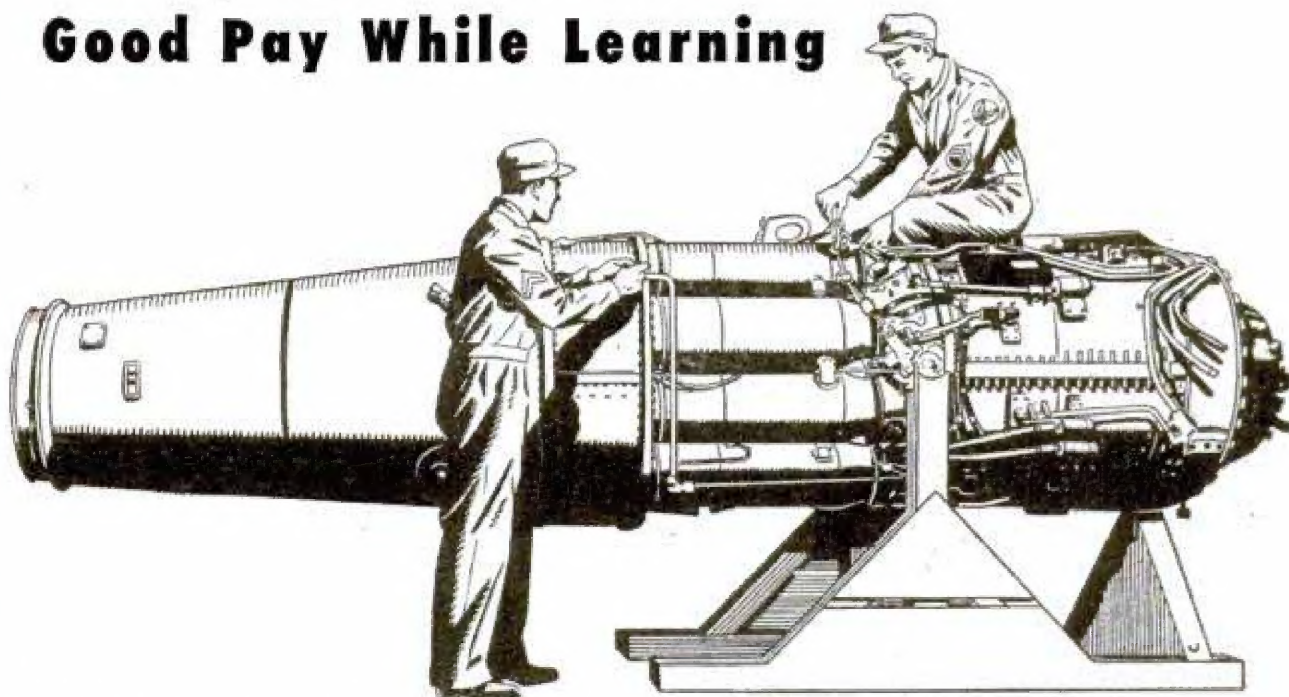
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H. H. WINDSOR, Jr., Editor and Publisher



Posies for "Vittles" Pilot

GRATEFUL for food and coal delivered by the air lift, a German girl presents a bouquet to an American pilot.

"Life Line to Berlin," page 114, is the story of this great air operation by Associate Editor Cookman, who flew from Chicago to Berlin. Wrapped in fog of arm's-length visibility he wrote home this lamentation from Frankfurt:

"Dear Boss: Got a crying towel handy? For the umpteenth time fog has me tied down tighter than a drum. On the heels of the 96-hour session the papers call the longest in Europe's history, another fog moved in last night and socked this place (Rhein-Main) and Wiesbaden in for the day. A C-54 attempting to push through at Fassberg this morning crashed and killed all its occupants. I sat up last night from Strasbourg here, and what with border authorities, etc., took 5½ hours to go 150 miles. They are letting nothing up this morning. I was told to go back to the hotel and sit close to a phone, in case the weather improved..."

Editor's note: He got there, as always—to Bikini in '46, to Alaska in '48. In fact, having spent several days in Berlin, he beat the above air-mailed letter to his office by a day.

Volume 91

FEBRUARY 1949

Number 2

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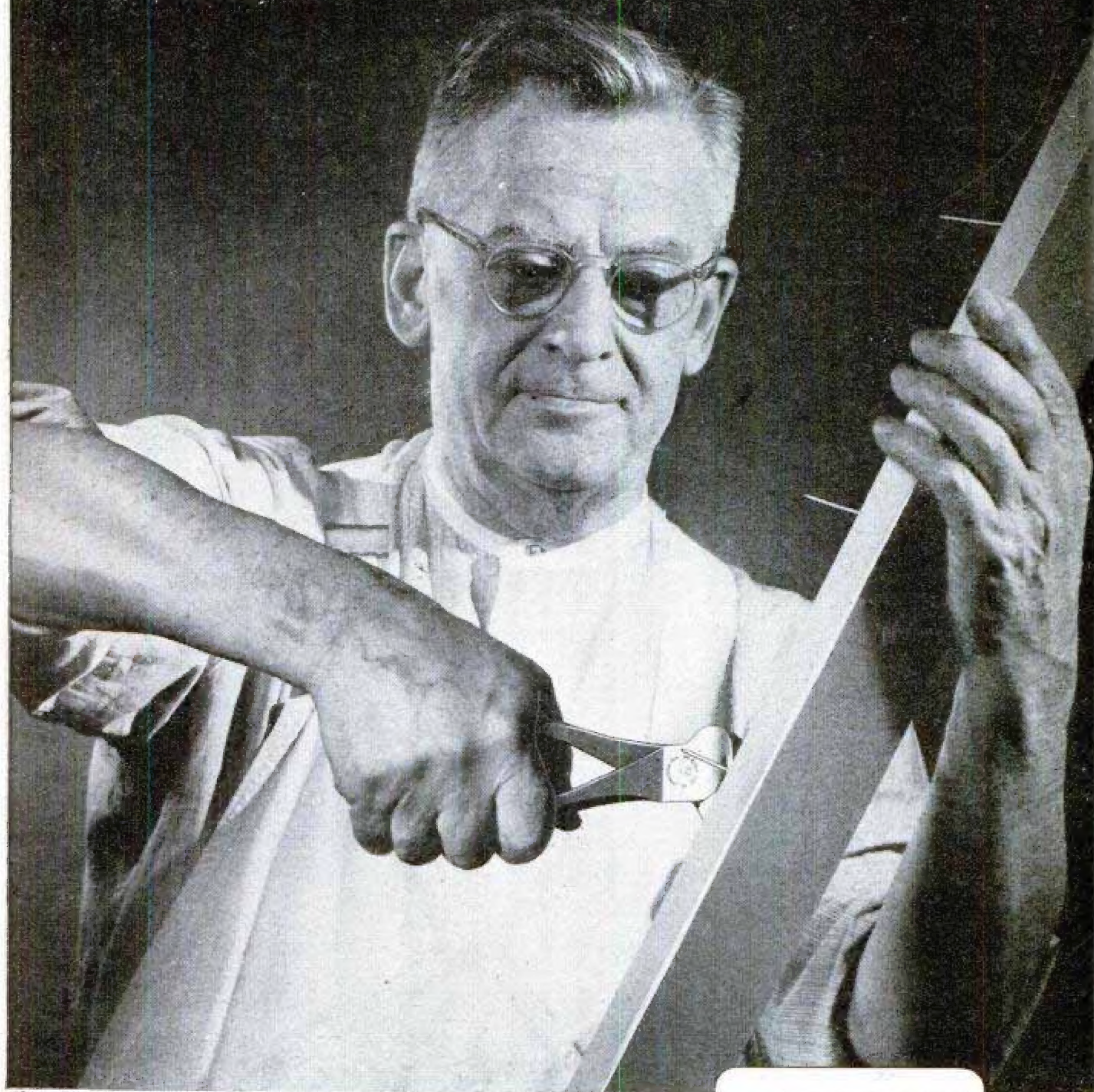
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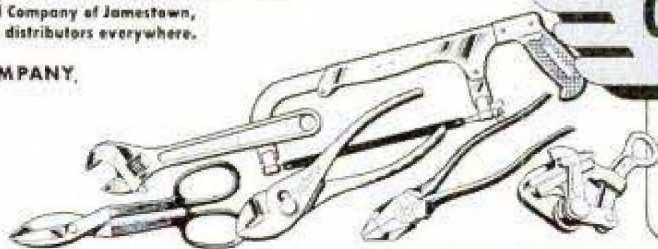
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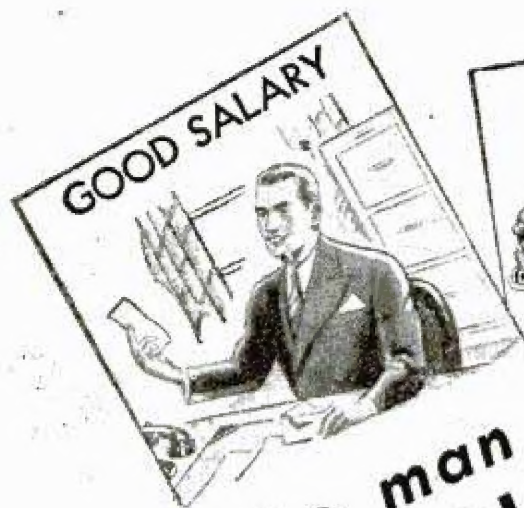
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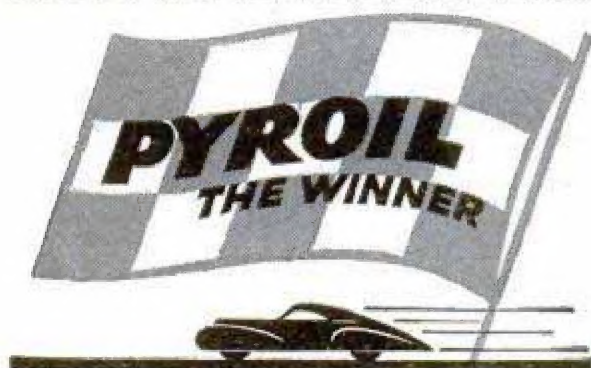
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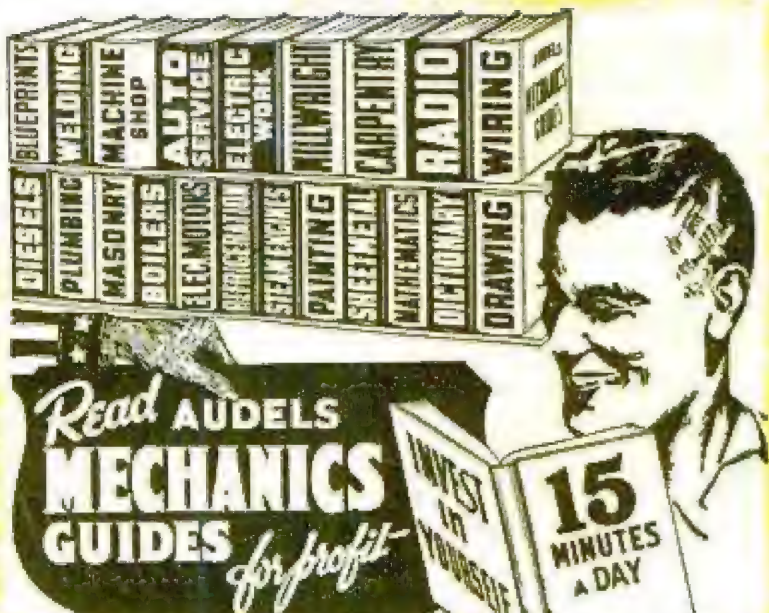
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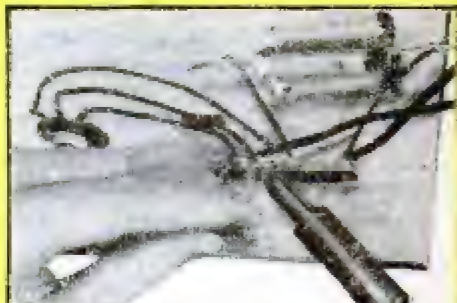
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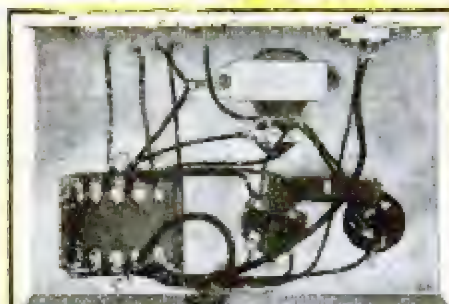
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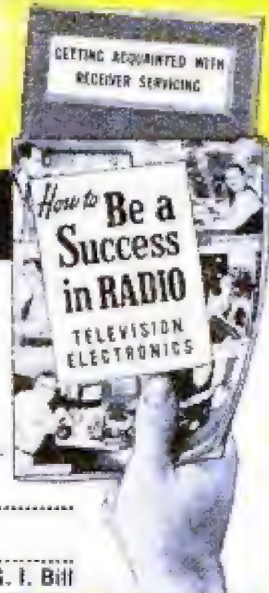
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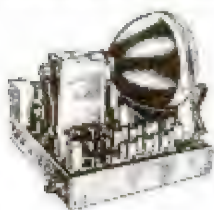
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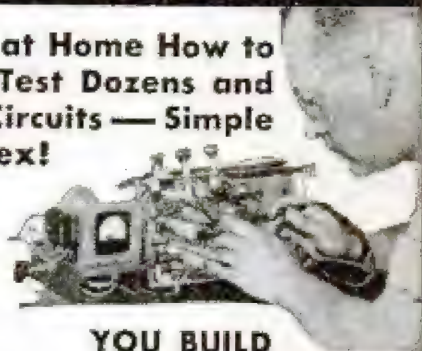
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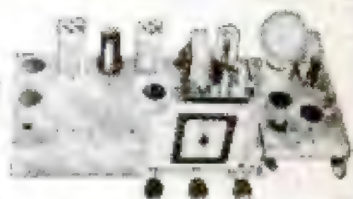


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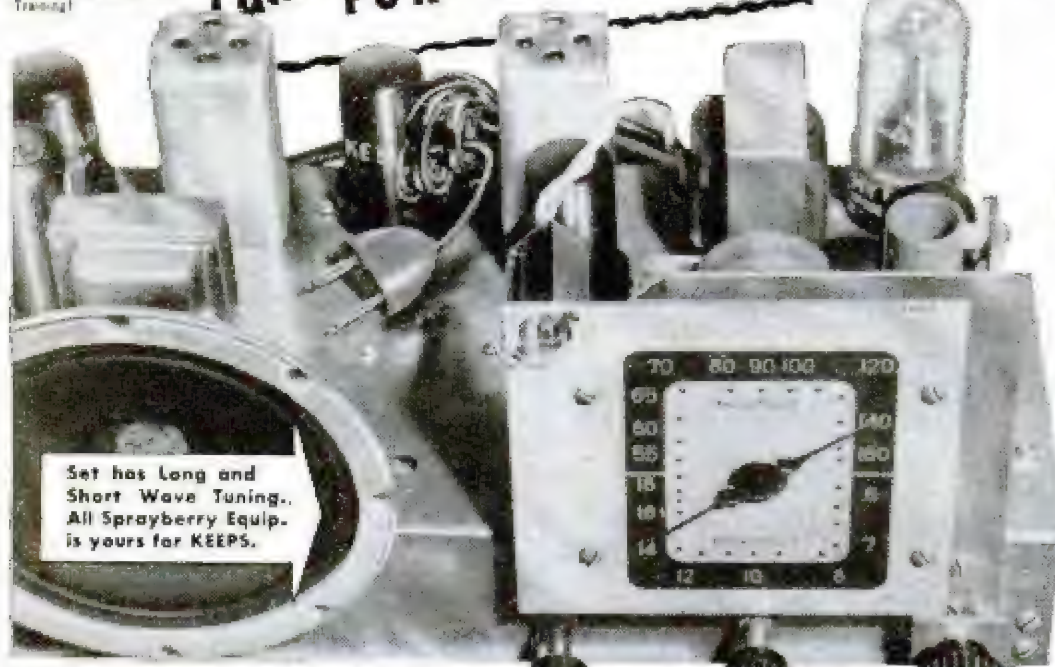
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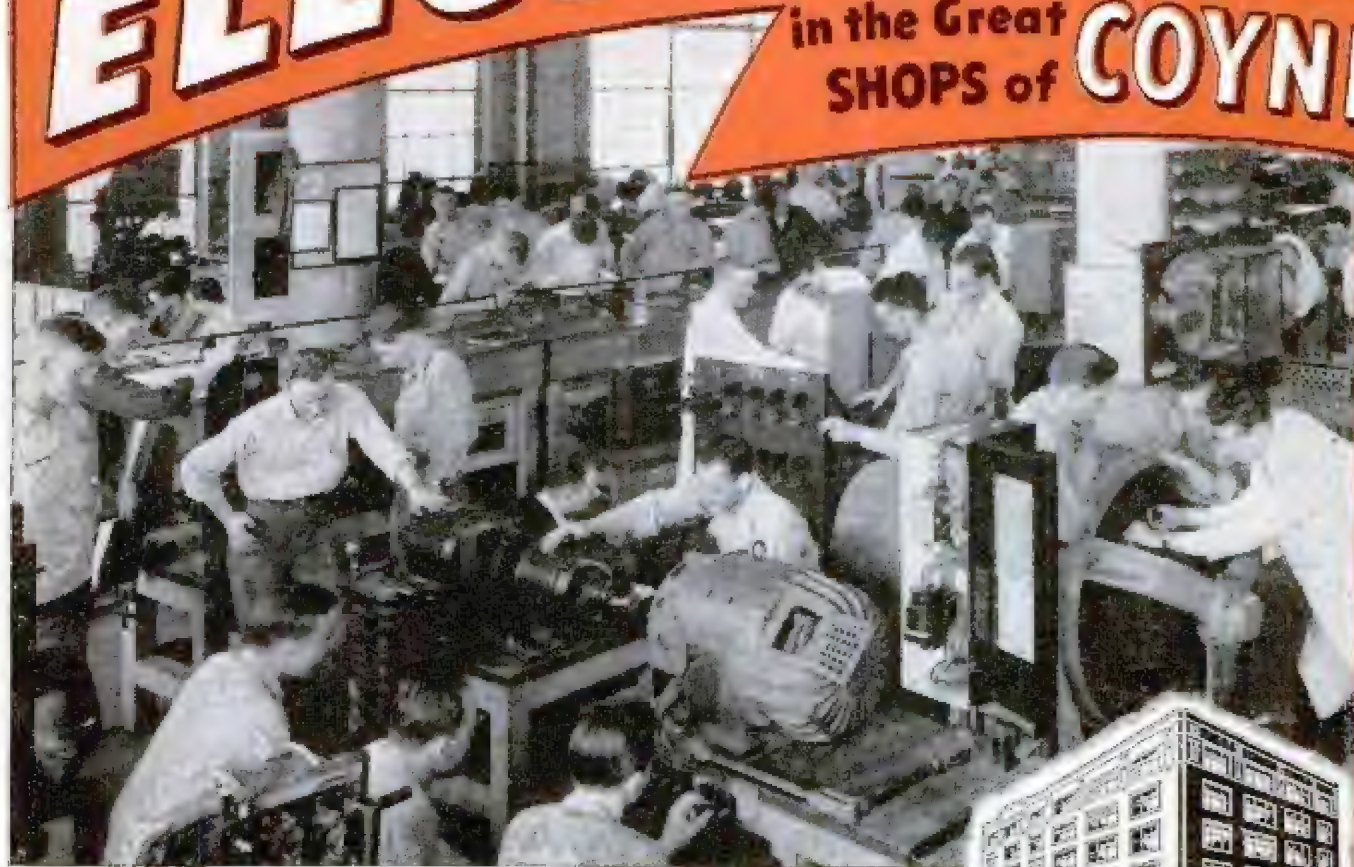
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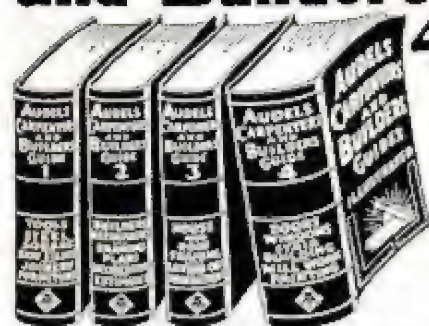
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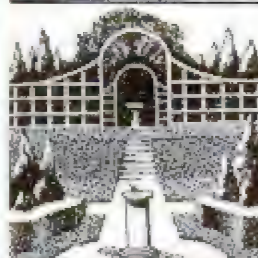
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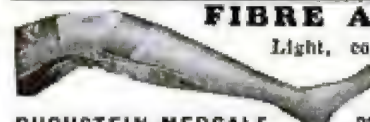


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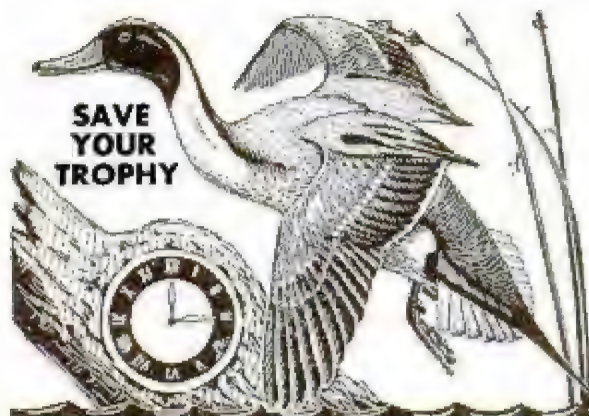
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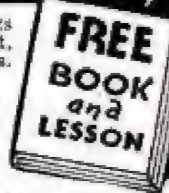
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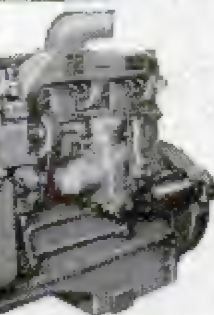
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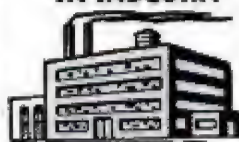
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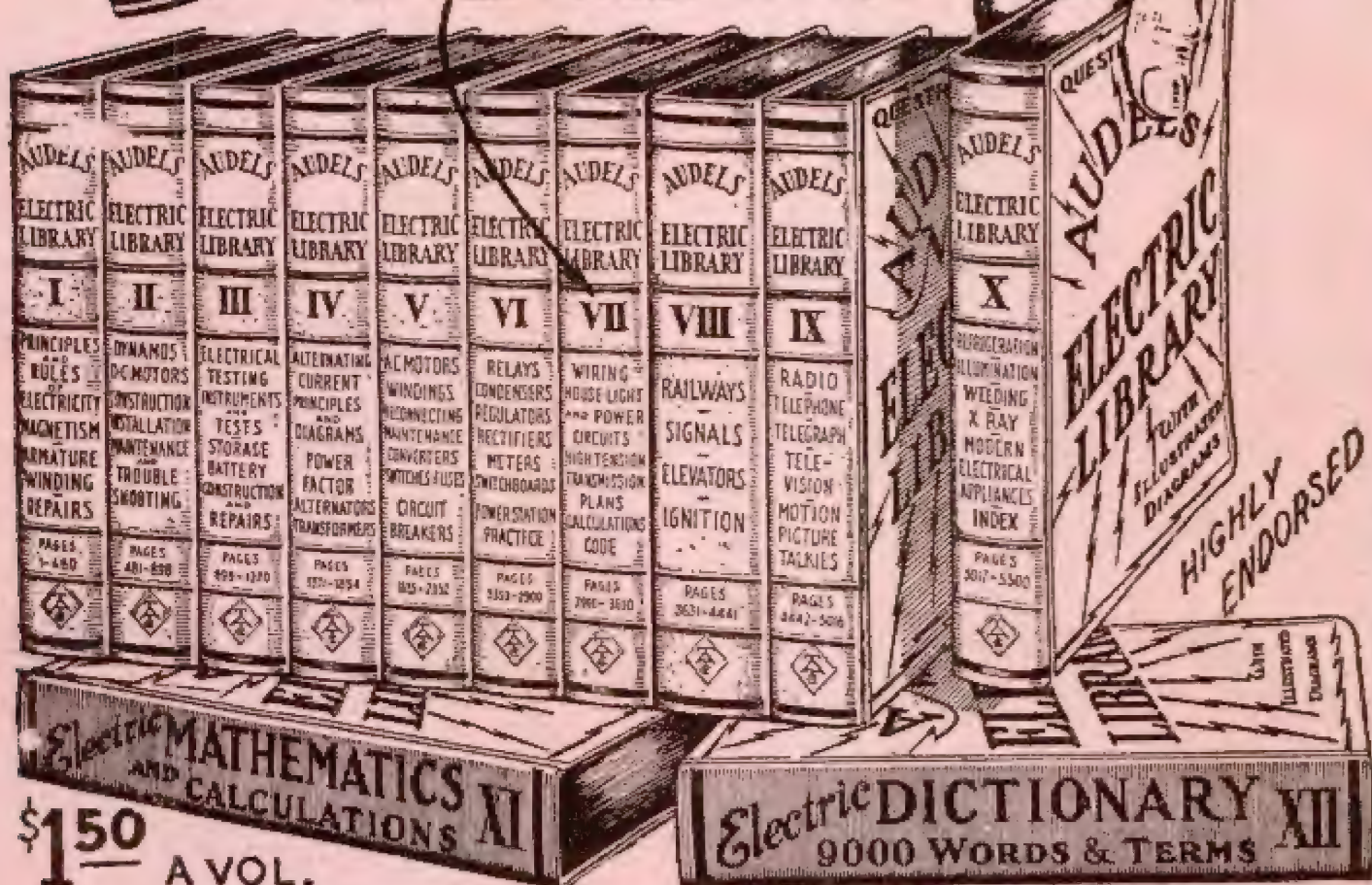
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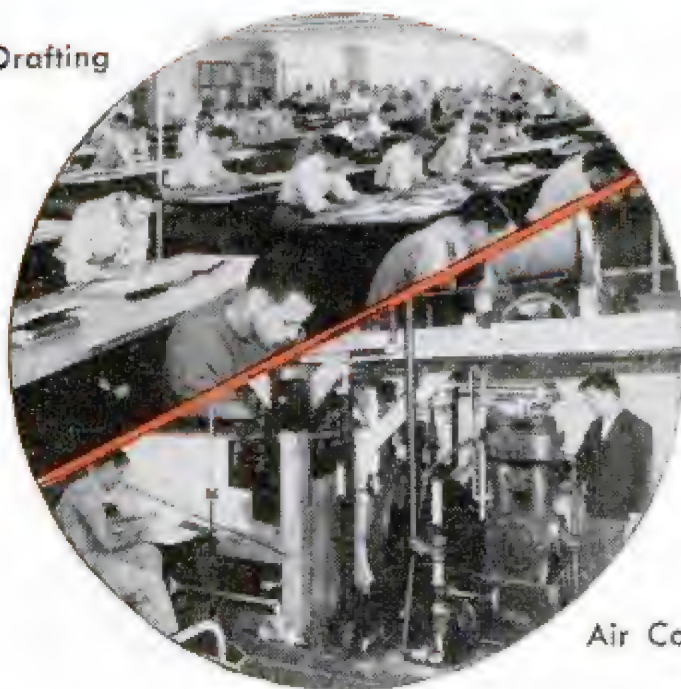
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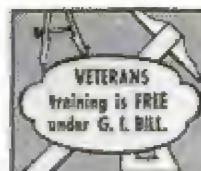
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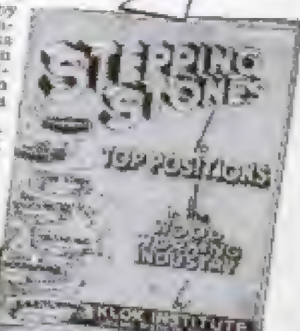
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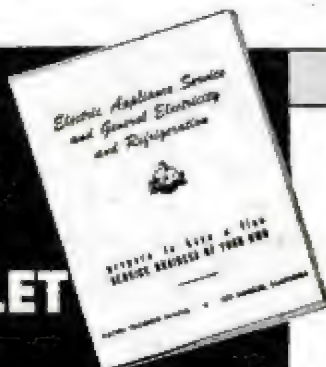
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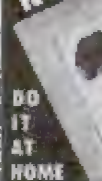
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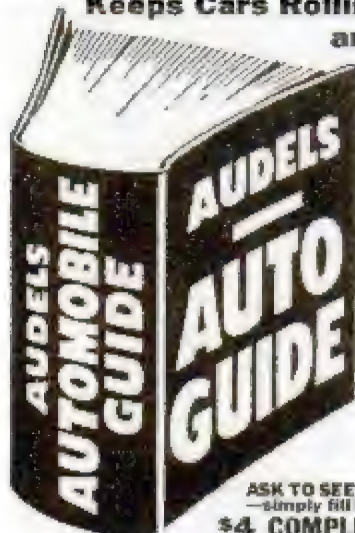
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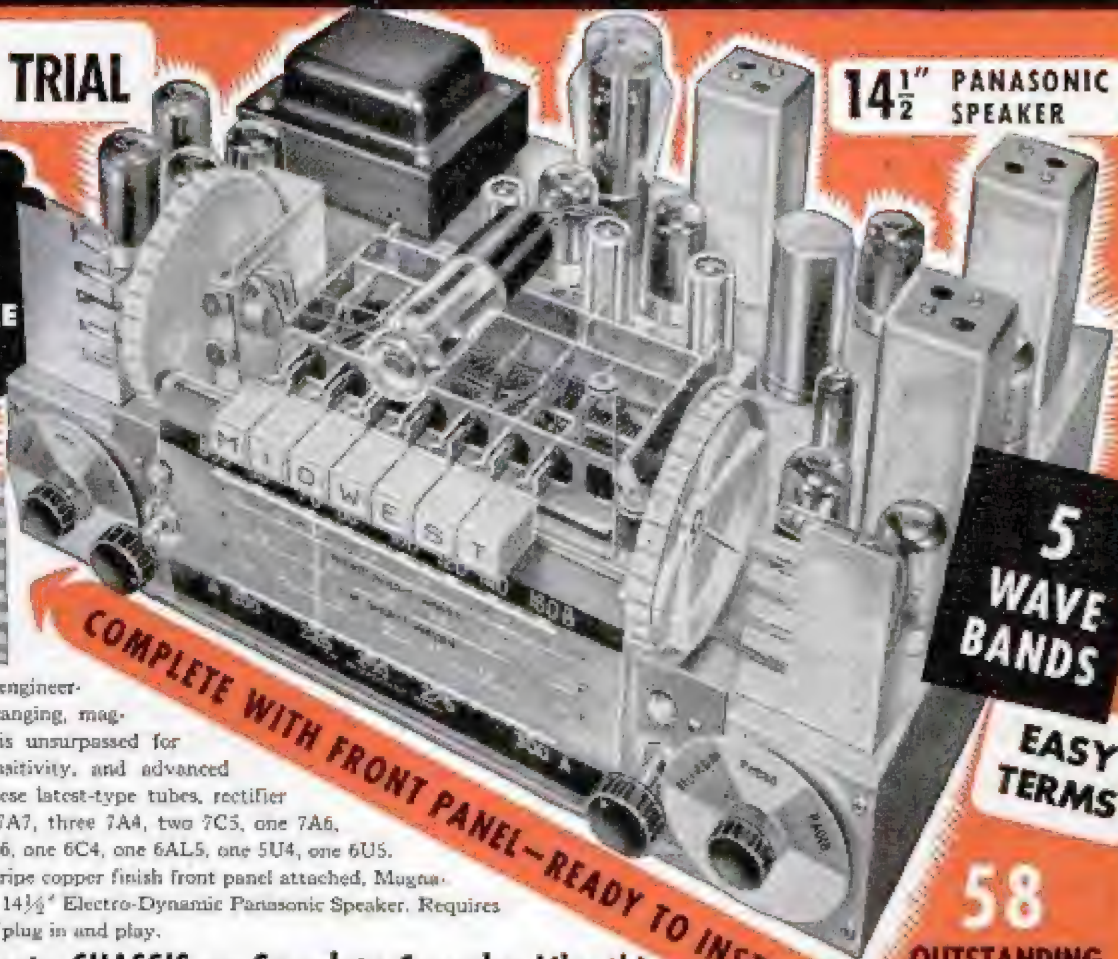
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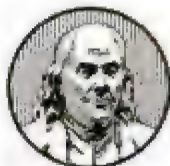
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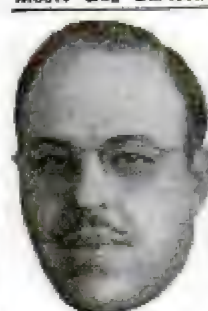
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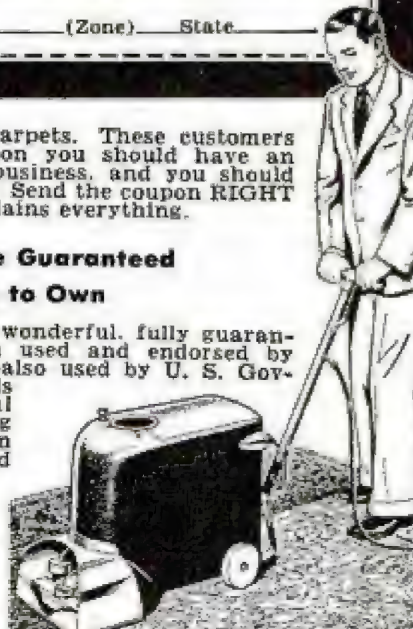
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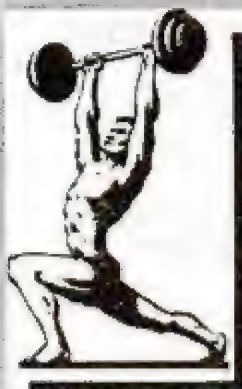
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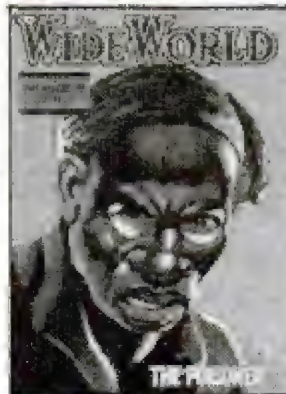
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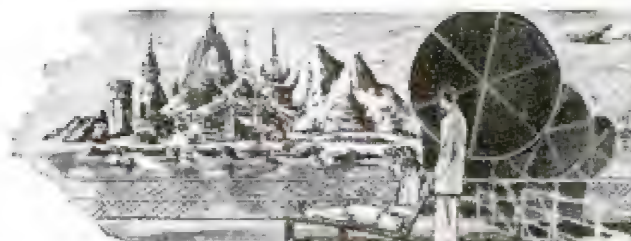
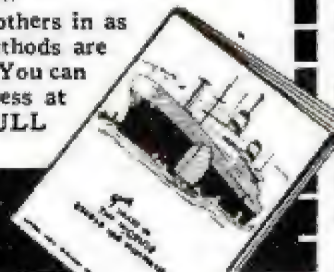
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MEN—Women — "Most everybody likes candy." Learn to make in a professional manner. (Our 39th year.) Ragsdale Candies, D4, East Orange, New Jersey.

EASY Profits taking magazine subscriptions. handling greeting cards and boxed stationery. Cassell Publishers, Westfield, New Jersey.

BABY Shoes preserved. Formulas, instructions \$1.00. Supplies and bases. Novelty Bronzing, Box 56, Hyde Park 36, Mass.

HOME Workers—Handle our mail business your territory. Lynn, 5710 Bankfield, Culver City, California.

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METALLIZING Baby shoes makes you money! Write today for your free copy of my new "Guide to the Baby Shoe Metallizing Business." Joseph B. Kushner, Metal Finishing Engineer, Stroudsburg 40, Penna.

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MAKE \$5.65 On every direct sale until you appoint a dealer. Then earn commissions on reorders. A proven necessity for all cars to save gas, oil and prolong motor life. Simple to install. Write for sales ammunition. Dept. M-1, Motor Economy, 1133 Broadway, New York 10.

EARN Money evenings, copying and duplicating comic cartoons for advertisers. Adservice, Argyle 1, Wisconsin.

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READ Progressive Mailtrade, the magazine that tells how to make money by mail. Dime brings sample and special offer. Progressive Mailtrade, Box 357, Sheboygan, Wisconsin.

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CANDY Manufacturing and marketing. complete course \$8.00. literature 10c. Philip Pate, Kissimmee 1, Florida.

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YOU Name it! We'll airmail formula \$1.00. Satisfaction or refund. Brown, 9111-K Hoyne, Chicago 20.

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MAKE—Sell cleaners, soaps, polishes, flavors, cosmetics. No machinery. Formula literature free. Kemico, Park Ridge 16, Illinois.

\$1.00 GETS You 21 money-making popcorn, candy apple formulas. We supply equipment. Concession Supply Company, Dept. A, Station "B," Toledo, Ohio.

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REAL Manufacturing formulas. Lists free. Cummings, Chemist, Gordon Ave., Syracuse 4, N. Y.

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AMAZING Liquid plastic pours cold, hardens in half hour. Clear, colors. Expensive equipment unnecessary. Embed photographs, coins, flowers, seashells. Complete kit only \$3.25. Kristalon Plastics, Dept. A-12, Box 29, Wilmette, Illinois.

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AGENTS To sell a fast moving item. Acclaimed by users throughout the country. Exclusive territories open for honest proven salesmen. Big profits to aggressive agents. If you can sell, then this is your opportunity. Write today. Speed Waxer Company, Dept. PM-2, 4451 Elston Ave., Chicago 30, Illinois.

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MAKE Money calling on friends. Show greeting card assortments—Birthday, get-well, others. Floral stationery. Gift wrappings. Experience unnecessary. Samples on approval. Wallace Brown, 225 Fifth Ave., Dept. E-4, New York 10.

FREE Water and our concentrates, makes flavors, lotions, shampoos, 72 products, labels, bottles furnished. Qualco, E-20030 Russell, Detroit.

ABSOLUTELY Free! Big package actual sample fabrics and style presentation of dresses, lingerie, hosiery, etc. Take orders. Commissions big. Send no money. Melville Co., Dept. 4775, Cincinnati, Ohio.

A DRESS For you with every 3 you order for yourself and family. Amazing new plan. Everything free. Harford Frocks, Dept. A-9128, Cincinnati, Ohio.

PLASTIC Tablecloth covers, curtains, drapes, baby pants, bowl covers and other plastic articles selling like wildfire! Make big money now! Free details. Write L & M Co., Dept. 58-B, 510 St. Charles, St. Louis, Mo.

EARN Big money. 21 Sunshine everyday cards with six lined envelopes \$1. 48 Sunshine notes for \$1. Sensational values. Costs 50c. Sells \$1. Also 1949 21 card Easter ass't. Birthday, get well, napkins, gift wraps, stationery. Write today. Samples on approval. Sunshine Art Studios, 115 Fulton St., Dept. PM-2, New York 8, N.Y.

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EARN Big money year 'round. Be a one-person-department-store. Take orders for shirts, ties, hosiery, lingerie. Household linens, etc. For information. Corporate Merchandisers, Dept. PM-11, 547 Broadway, New York City 12.

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EXTRA Cash income. Sell friends new, different greeting card assortments, exclusive stationery unobtainable elsewhere. Profits to 100%. Bonus. Request free samples exclusive personalized stationery and all-occasion samples on approval. Regal Greetings, PM-5, Hazel Park, Mich.

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MUSIC Greeting cards. All occasions. Dorby Music Cards, P.O. Box 738, Morristown, New Jersey.

SELL Ultra-blue stock signs to stores. 1000 slogans, comedy, general, religious. "Tx11" cost 8c, sells 35c. Make money. 15 samples ultra-blue signs "Tx11" \$1.00 postpaid. Lowy, 8 West Broadway, Dept. 445, New York City 70.

AMAZING Offer—\$50 is yours for selling only 100 boxes entirely different, new deluxe all-occasion cards. Patented feature television card included. Each box sells for \$1.00, your profit 50c. Surprise items. It costs nothing to try. Write today for samples. Cheerful Card Co., 542, White Plains, N. Y.

BUY Thousands of nationally advertised products direct from manufacturers. Write for "buy direct and save." Consumers Assn., 218-P Investment Bldg., Pittsburgh 22, Penna.

NEW "Sponge" wall cleaner. Erases dirt like magic. Wallpaper, painted walls, ceilings. Saves redecorating. Lightning seller. Samples sent on trial. Kristee, 114, Akron, Ohio.

SCHOOL Seniors! Your postal will bring our wonder. Kwik-Sell Cardalog of popular graduation name cards. Biggest profits! Only firm giving free souvenir chest and card case. Don't miss out! Hurry that postal! Craftcards, Box 235(L), Pittsburgh 30, Pennsylvania.

400% PROFITS Selling genuine, guaranteed, "NuSilver Polish and Plating Liquid." Apply with cloth. Stores, offices, homes. NuProcess Products, Aurora, Ill.

LOOK! Special money-making opportunity! Profits to 100%. Bonus. Sell irresistible all occasion greeting card assortments, new style gift wrappings, plastic cards, exclusive stationery. Special offers. Request free name imprinted and floral stationery samples and all occasion boxes on approval. New England Art Publishers, North Abington 78, Mass.

UNUSUAL Profits—Agents say our best deal since 1927. Postcard brings particulars. Maslon Marivonne, Dept. F, Troy, Missouri.

AT Last! Something new and sensational in everyday cards. Gorgeous satin and velvet designs. Get orders fast. Big profits. Imprinted stationery. Floral charmettes, napkins. 25 assortments for all occasions. Retail 50c to \$1. Samples on approval. Pure Co., 2801 Locust, Dept. 940-B, St. Louis 3, Mo.

COULD You use more money? Make up to 100% cash profit selling friends greeting cards. Novel all-occasion, birthday assortments. Gift wrappings, stationery. Bonus. Free samples name imprinted, floral stationery and new all-occasion samples on approval. Special offers. Write Pilgrim Greetings, 111 Summer, Dept. AN-1, Boston, Mass.

AGENTS: Stamping names on pocket-key protectors. Sample check with your name, address, 25c. Stamping outfits. Emblem checks, check-fobs, name plates. Hart Mfg. Co., 303 Degraw St., Brooklyn, N. Y.

DO You want \$25? Sell 55 boxes, lovely greeting cards, to friends, co-workers, neighbors. Free literature shows you easy way to make money. Send \$1 for beautiful sample box and receive one box free. Torres Co., 373 Fulton St., Brooklyn 1, N. Y.

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EARN Many dollars now with Thomas Terry's amazing new springtime and year 'round plans. Send today for two unusual assortments on approval and new free display folders. Write Thomas Terry Studios, 200 Union Ave., Westfield, Mass.

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MAKE Big money with the wonderful new, "Pink Satin" cream shampoo! Sells fast! Sales repeat! Splendid money-maker for you! Rush name for interesting free details, today. Demo Laboratories, Bogota, N. J.

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PHOTO-Salesmen-agents. Sell beautiful hand-colored plastic enlargements. Collect deposit, we deliver. Profitable sideline. Send card, for free sample kit. Novel Portrait Co., 3343 North Ave., Chicago, Ill.

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AGENTS Make big money selling "Ear-Buds," the perfume earrings with a place for mi-ladies own perfume. Every woman a prospect. Real jewelry, smartly packaged, 24k, gold plated. Sample \$1.68, tax included. Particulars free. Minot Inc., Box 77, 22 Minot Street, Dorchester 22, Massachusetts.

SELL Shoes. \$100.00 weekly selling 6 pair Miracle Cushion shoes daily. No investment. Experience unnecessary. Free outfit. Samples. Advance commissions, bonus. Paragon Shoes, 739 Columbus, Boston.

FREE Nylons given if Kendex hosiery runs or snags! World's only women's hosiery sold with written guarantee amazing everybody. Mere words could not express unbelievable money-making opportunity. Fantastic earnings become reality. Armstrong earned \$202 in 9 days. Watkins sent 92 orders in one day. Imagine replacing hosiery free regardless of cause—whether use or abuse! Truly sales dynamite for terrific profits. Even if you never sold before, three magic words: "Guaranteed Against Everything" will open doors for you—make women listen and pour money in your pocket. Complete line from sheepest to service (15-20-30-40-60 denier) all lengths 28 to 35 inches—latest colors—seamed full fashioned and seamless. No competition because Kendex guaranteed nylons not sold in stores. Also complete line men's hosiery actually guaranteed for one full year! Nothing like this anywhere. Includes rayon, nylon, lisle, wool, cotton, mixtures, etc. All styles, patterns, colors, prices to please everybody. Thousands shipped daily, 100,000 pairs constantly in stock for fast delivery. Over 30 years in business. You need no money or experience. Nothing to pay now or later. Show free outfits. Write orders. We deliver and collect. Big advance cash plus huge bonus. Earn money spare or full time—exclusively or side line. No restrictions. Become manager—appoint others to sell for you—earn steady income on their sales. Complete money-making outfits including salesbooks in color, samples of hosiery materials, etc. furnished free and prepaid. Simply mail name and address to: Kendex Company, Babylon 23, N. Y.

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SELL By mail books, novelties, bargains! Ready made circular service! Large profits! Catalog free! Ellico, 432 North Wells, Chicago 10.

SCHOOL Seniors—Earn 40% commission selling classmates America's most beautiful graduation name cards. Largest selection. Outrivals all others. Free sample kit. Printcraft, Dept. M, 1425 E. Elm St., Scranton 5, Penna.

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BOYS Wanted. Over \$2.00 hour! Sell name plates for front doors. Free sample. Write Dept. 43, National Engravers, 214 Summer, Boston, Mass.

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BRUSH And mop salespeople—Sell our improved 1949 model cellulose sponge mop with rubber window wiper, direct to homes. Earnings up to \$25.00 daily. No stock to carry. No delivering. We ship direct to customers, c.o.d. Write National Brush & Broom Co., Dept. PM-2, Valparaiso, Indiana.

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UP TO \$50.00 in a week and tailored suit for yourself without paying one cent. Write for plan, Stonefield Corp., Dept. P-817, 1300 W. Harrison St., Chicago 7, Ill.

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BIG Money quickly and easily taking orders for complete line personalized initialed buckles, belts, cap badges, 2,000 emblems. Fast repeats. Write today, Hook-Fast Company, Box 480-PM, Roanoke, Virginia.

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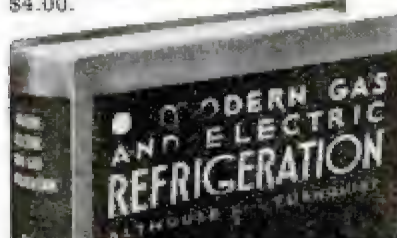
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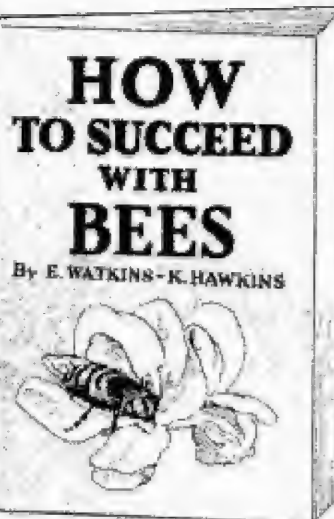
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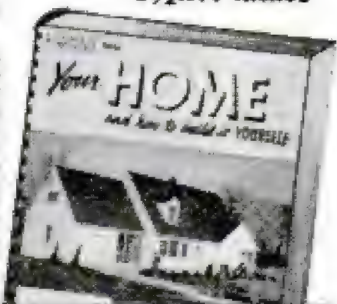
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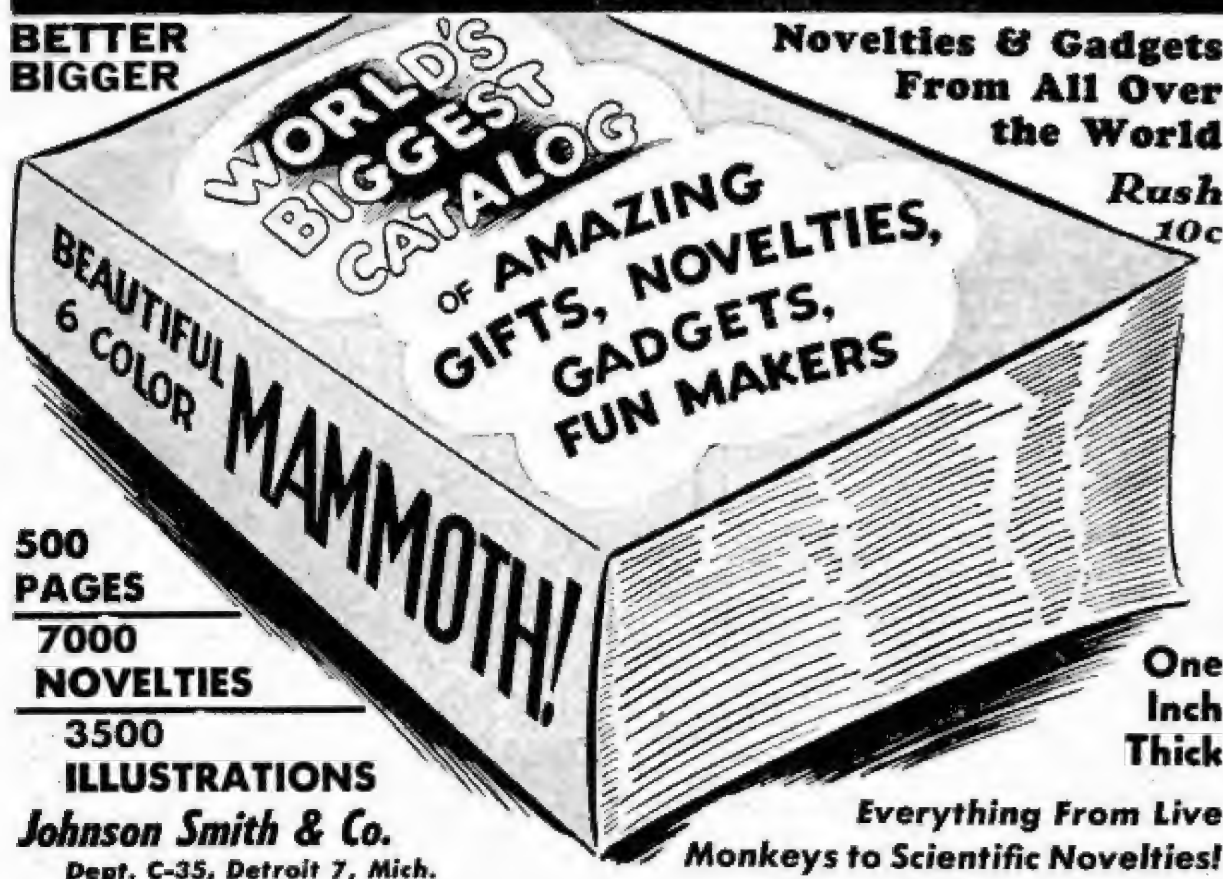
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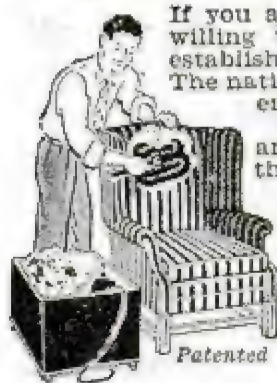
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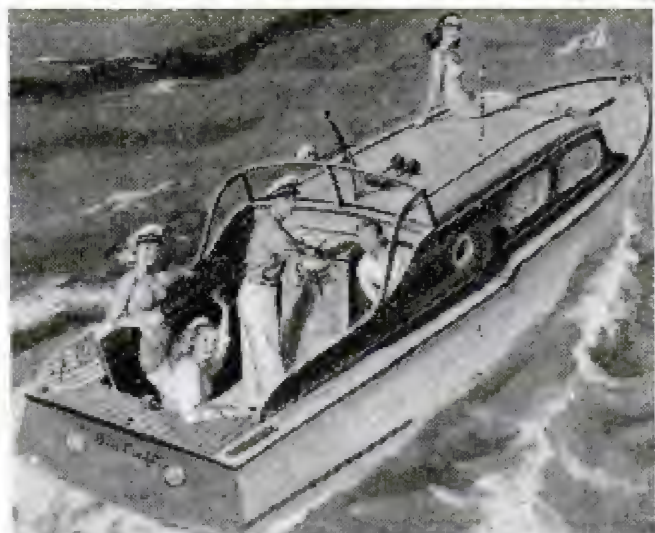
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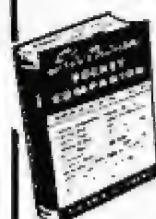


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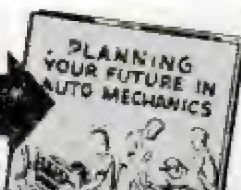
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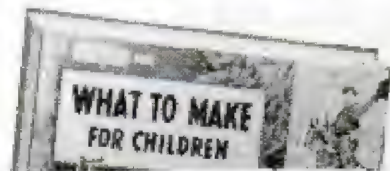
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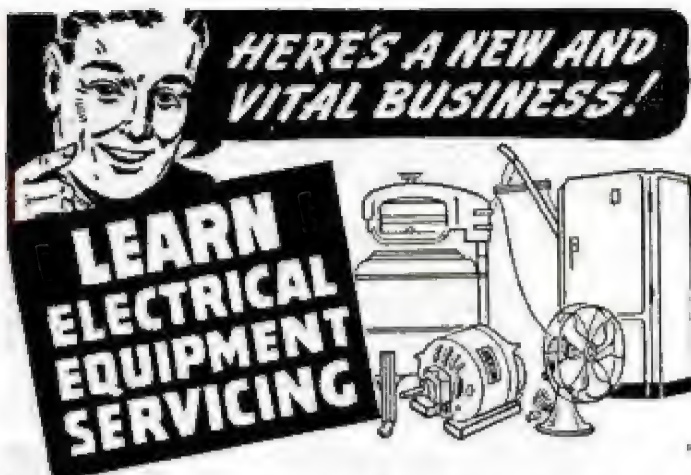
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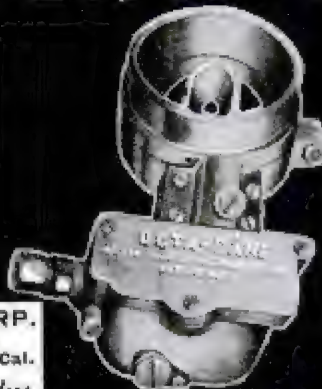
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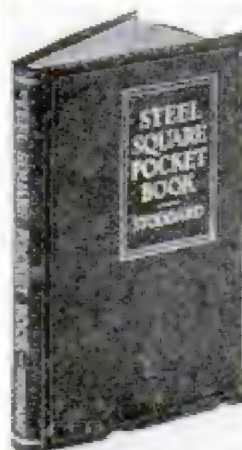


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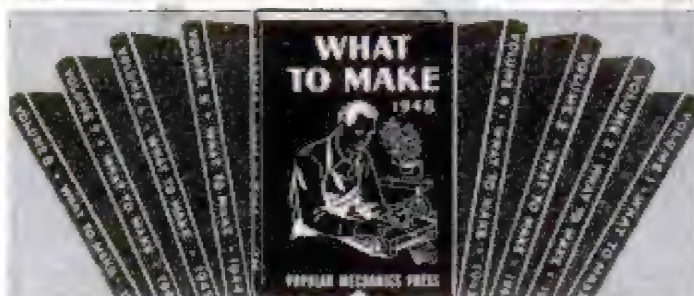
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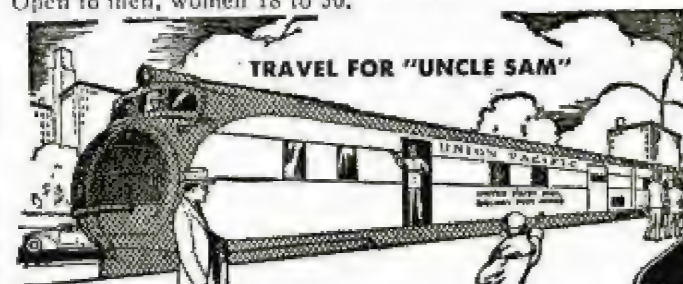
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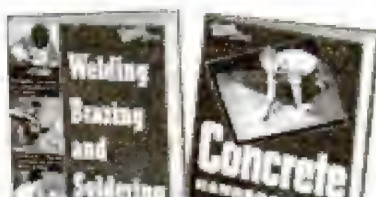
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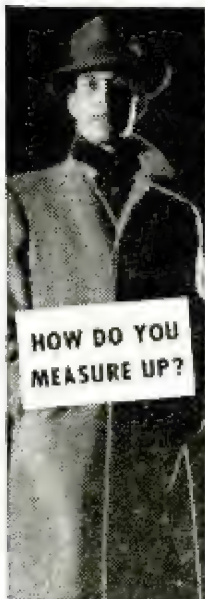
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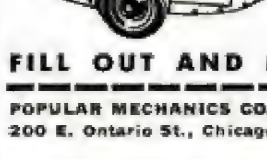
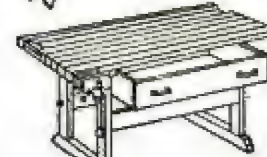
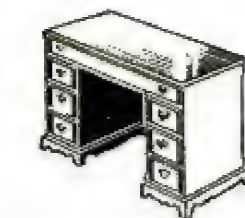
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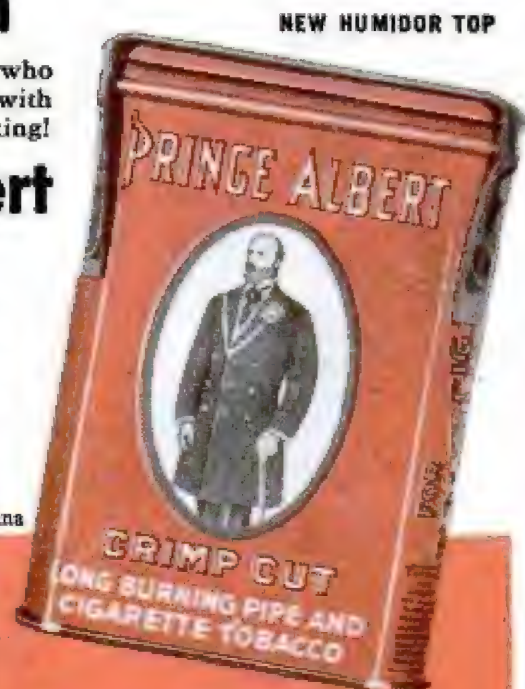
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THE NATIONAL JOY SMOKE

POPULAR FEBRUARY 1949 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 91 NO. 2



9 uranium rush

PROFESSIONAL and amateur prospectors by the thousands are literally leaving no stone unturned in the great uranium rush of '49. The ores which yield atomic energy are being sought in every part of North America.

Excited by reports of government rewards, many of the prospectors are wasting their time in localities where uranium of worthwhile quality can hardly be expected to be found, though there is always a chance that someone may upset the convictions of mining engineers by making a "strike" in a new region.

The Atomic Energy Commission wants to see samples of any ores suspected of containing valuable amounts of radioactive materials, but prospectors are urged to make reasonable tests of their samples before submitting them. Misinformed or overly enthusiastic people have submitted hundreds of samples of worthless rocks, including ordinary concrete, to the commission.

A woman in Alaska sent in a piece of wood from a birch tree which had shown traces of fluorescence. A Texas rancher sent in samples of earth from his ranch because he stated that when his cows walked in the area from which the earth came they invariably collapsed. Another citizen reported that he had seen a ball of



This 20th-century '49er is looking for uranium—not gold. He carries a radiation counter which reveals radioactivity in rock. Here he has lifted counter tube from unit to test ledge

fire rolling in the valley and that this was evidence of uranium. He was asked to provide a sample. One recent sample was carefully packed in a hot-water bottle, probably to shield the public from radioactivity which it failed to possess.

The latest important discovery was made by a smart Canadian prospector, Robert Campbell, who did his preliminary exploration work in a Toronto library. Poring over reports of prospectors who had sought copper ore a century ago, Campbell found that some of the reports mentioned deposits of uranium about 70 miles north of Sault Ste. Marie. Uranium was worthless 100 years ago and no one bothered to work the mineral or even to describe exactly its location.

Equipped with a Geiger-Mueller radiation meter, Campbell spent most of last summer in the region covered by the reports, probing the rocky shore of Lake Superior and climbing 1000-foot cliffs in his search. Week after week his earphones gave out only the normal background response, then while exploring a place called Alona Bay the earphones began to buzz wildly. He was standing within a few feet of a two-inch seam of black pitchblende. Ore that runs 10 percent uranium is considered very valuable; Campbell's discovery has a 60 percent radioactive content. Today, 500 claims or more have been staked out surrounding his find.

From now on the United States and the whole world can hardly find enough uranium and thorium to satisfy their needs. As producers of energy and for military uses, rich radioactive minerals are far more precious than gold. Canada, Belgian Congo and Czechoslovakia contain the principal known deposits. In the United States, uranium-bearing ores have come mainly from an area on the Colorado-Utah border. A recent pitchblende strike was made near Boulder, Colo. Deposits of low-grade materials so poor that they are not worth working with present techniques occur in many parts of the country.

Nevertheless the Atomic Energy Commission desires desperately to uncover any new sources of worthwhile ore and the commission has announced that a \$10,000 prize or bonus will be paid for the delivery of 20 tons of ore or concentrates that assay 20 percent or more in uranium oxide, provided that the material comes from a new, previously unworked deposit. In addition the commission will pay for the ore at the ordinary price. The offer applies to any discoveries inside the United States, its territories, possessions and the Canal Zone. The offer does not apply to carnotite-type ores of the Colorado plateau, neither is the reward paid simply for discovery or report of a new ore body. Twenty tons of good material must be delivered before the prospector can collect.

In the field—prospector holds "probe" containing counter tube to rock sample as he listens for "clicks." In the assay office—the heated sample will fluoresce after it is cooled and exposed to ultraviolet light



The guaranteed minimum AEC price for uranium ores is at the rate of \$3.50 per pound of uranium oxide that is recoverable from the ore, less refining costs, plus allowances for other valuable minerals that may be contained in the ore. Carnotite ores are priced on a different schedule at rates that vary from 30 cents to \$1.50 per pound of contained uranium oxide, plus certain bonuses, plus allowances for other valuable constituents. Carnotite purchases are made in minimum lots of 10 tons. Ores that assay less than 0.10 percent uranium oxide or that contain excessive quantities of lime are not purchased.

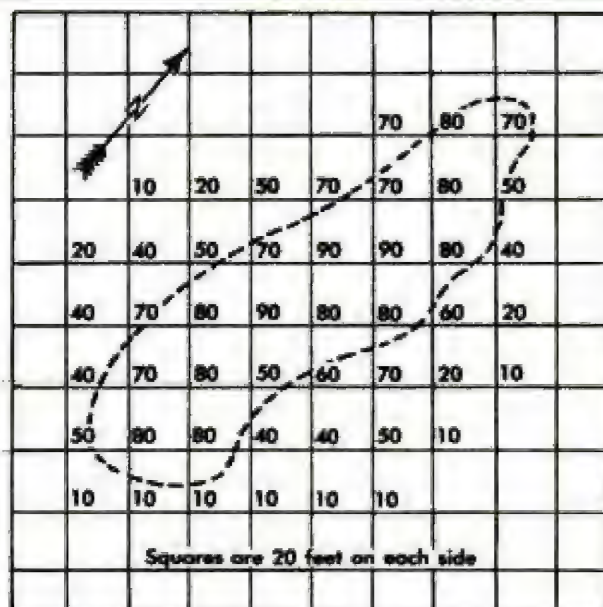
In all there are more than 100 recognized uranium ores, of which only a few are rich in radioactivity. The so-called primary ores are the most valuable, these being massive pitchblende that runs from 50 to 80 percent uranium and from which radium is also extracted, and crystalline uraninite, 65 to 80 percent uranium. Each is apt to occur in veins or dikes scattered through quartz formations. Each is dark, heavy, brittle and metallic or submetallic in appearance. Pitchblende may be associated with silver, nickel, or other metals, while uraninite often occurs in or near a deposit of black mica. Any dark, heavy mineral that is discovered in a pegmatite formation should be tested for possible uranium content. Black tourmaline and hornblende, often mistaken for uranium, are of a lighter weight with translucent splinters.

The secondary group of uranium compounds includes carnotite and autunite, or tobernite.



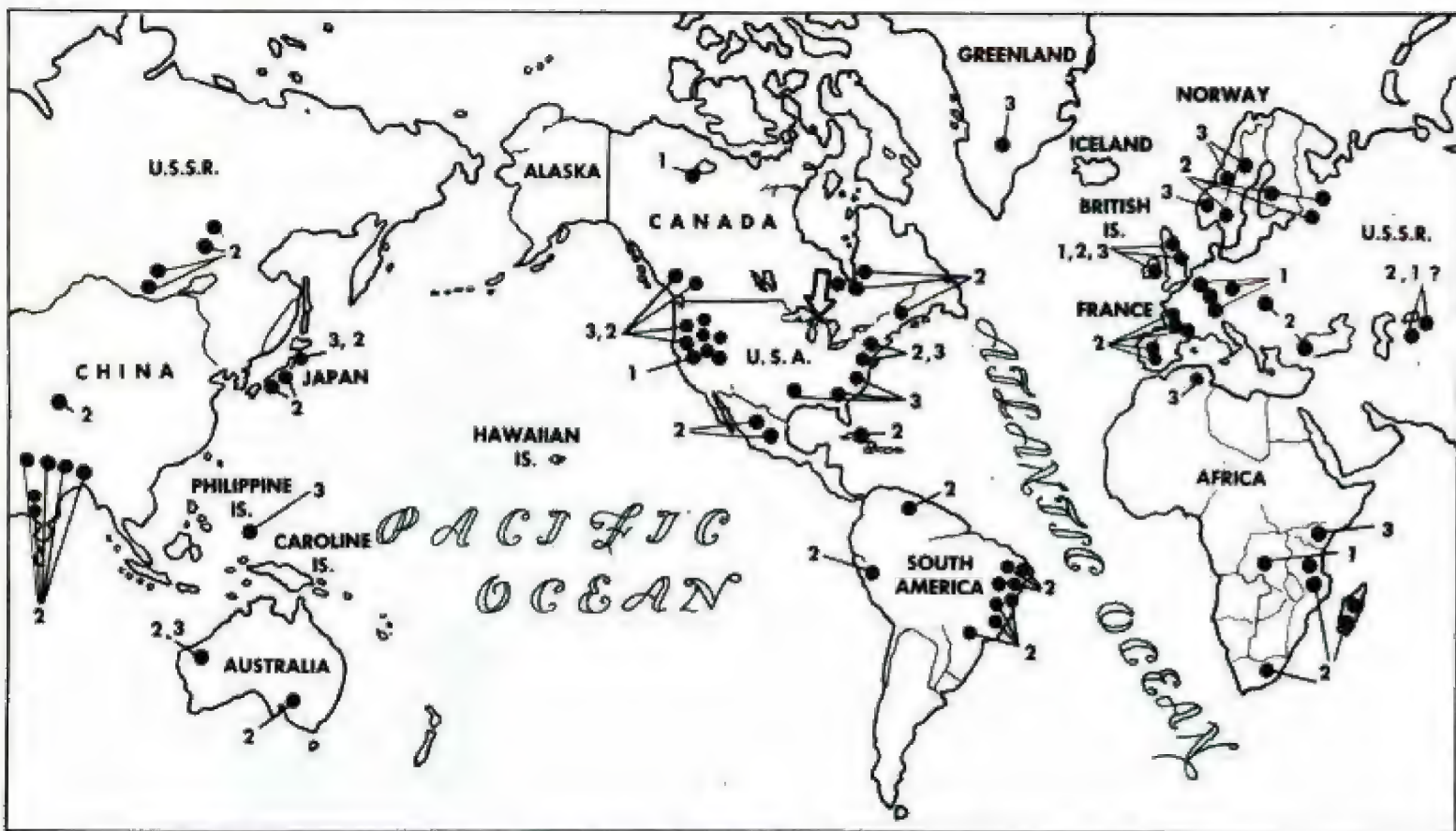
Above, final test of uranium ore is made with a \$7000 Geiger-Mueller counter X-ray spectrometer that records all elements contained in sample

Right, prospector's chart shows counts made at corners of 20-foot squares. He then can tell size and shape of subsurface ore so he can judge extent of strike



Below, quantitative test of pulverized sample reveals the exact percentage of uranium in the ore. The assay-office worker here is using a special counter





Copyright by Jack DeMent and H. C. Dake, Handbook of Uranium Minerals

World map shows location of known uranium areas. 1. Important producers. 2. Known deposits of radioactive minerals which have been worked in the past and are potential source. 3. Other known uranium localities

Some are rich enough to be valuable, some are simply impurities in the basic material. They may be found chemically united with lead, copper, or vanadium, among other elements, or they may occur as precipitated material in sedimentary formations. The secondary minerals are characteristically brilliant yellow, orange, or green, depending on associated elements, and they are apt to be found in the form of powdery crusts. Long exposure destroys their brilliant coloring. Colored crusts or veins near the surface, however, may be an indication of much richer ore below or nearby.

The group of thorium minerals, also sought after because of their radioactivity,

is often found in association with uranium. Different kinds of thorium may occur as cubes or other crystals and may be dark red, brown, or yellowish in color. Beach sands sometimes contain monazite crystals, one of the thorium minerals, just as they sometimes contain heavy black grains of primary uranium materials.

The United States has very few known deposits of primary uranium and few, if any, of these are very extensive. Deposits of secondary compounds are found from Maine to California, along both coasts, and in many parts of the West. Some are high-grade, most are worthless; all are being sought and evaluated today. Principal center of prospecting activity ranges roughly from Holbrook, Ariz., to Grand Junction, Colo.

Prospecting for uranium can be hard work but detecting the material is easy. This is because of the uranium prospector's newest tool, the Geiger-Mueller radiation meter that gives an immediate response when it is brought close to any radioactive material. Commercial portable models made especially for prospecting cost from \$125 to \$250 and thousands of

Exposed to ultraviolet lamp, uranium ore may fluoresce but this is not a sure test as reaction may indicate other minerals





them have been sold in the last few years. In this issue of *Popular Mechanics* (page 238) a lightweight portable model that you can build yourself for prospecting and for other uses is described in detail.

Simply stated, the heart of a Geiger-Mueller radiation meter, often shortened to "Geiger counter," is a glass tube filled with some nonconductive gas such as argon and containing two electrodes. A potential of 800 volts, higher for some models, is placed across the two electrodes, the voltage being just under the amount required to cause a discharge across the gap. When a gamma ray from any source happens to enter the tube, it is attracted to the central positive electrode and the ray's ionized path through the gas permits a momentary discharge from one electrode to the other. This discharge, amplified, is registered in the earphones as a click, or it may be indicated on a microammeter or even by the flashing of a small neon lamp. Current for the high potential and for amplification is furnished by batteries contained in the instrument's case.

The Geiger-Mueller radiation meters are used for the detection of lost amounts of

(Continued to page 266)

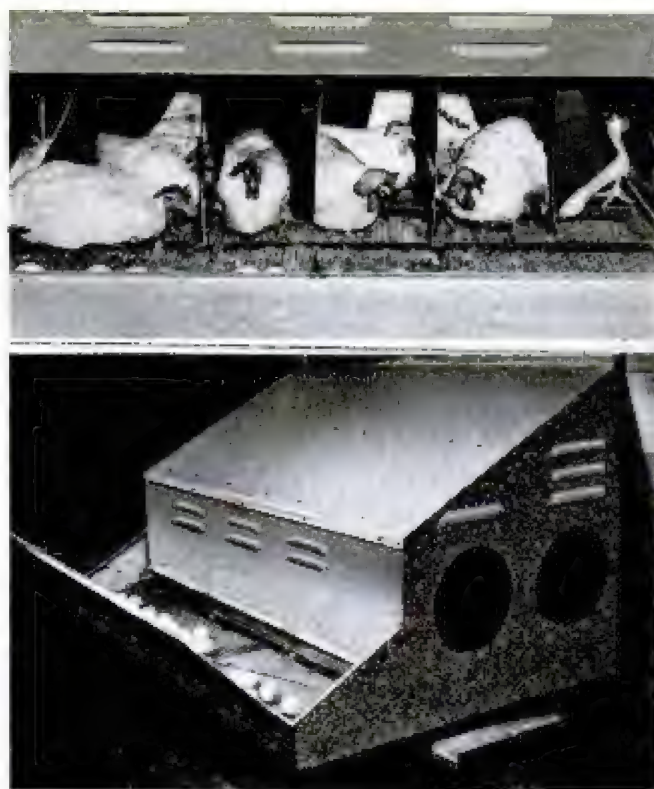
Scene of Canada's latest uranium find is this rocky shoreline along the eastern coast of Lake Superior, 70 miles north of Sault Ste. Marie, Ont. The discovery was made by Robert Campbell (below), Toronto mining man who spent weeks combing area with a radiation counter. He is shown beside his claim stakes





Four-Passenger Stroller

Although they have three children and a dog in their family, a Sunday stroll is a well-organized operation for Mr. and Mrs. Wayne Hetsler of Chicago. They just load the youngsters and dog into a four-seated stroller Hetsler built and they're ready for the walk. Collapsible, the stroller fits easily in the family car. The fourth seat also serves as a package rack when necessary.

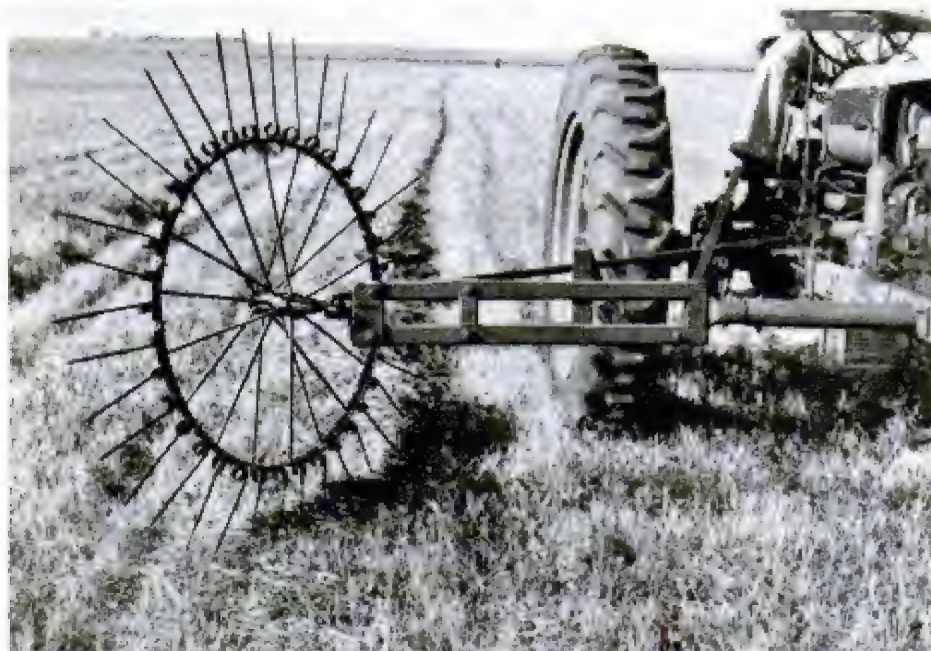


Top, a door swings up, revealing the sectional interior of the community-type nest. Above, the eggs roll down a metal screen to a collecting trough

Automatic Egg Collector on Nest

Eggs are automatically removed from under the hens when they are laid in a community-type nest. The eggs roll down a sloping screen into a collecting compartment where metal walls aid in dissipating the heat. The nest is easily cleaned with a removable tray beneath the screen. Each nest accommodates 70 to 80 hens and has four entrances covered by flaps. The interior is divided into sections and the front of the nest is hinged and swings back.

Spring-Pronged Wheel Turns Windrows for Quick Drying



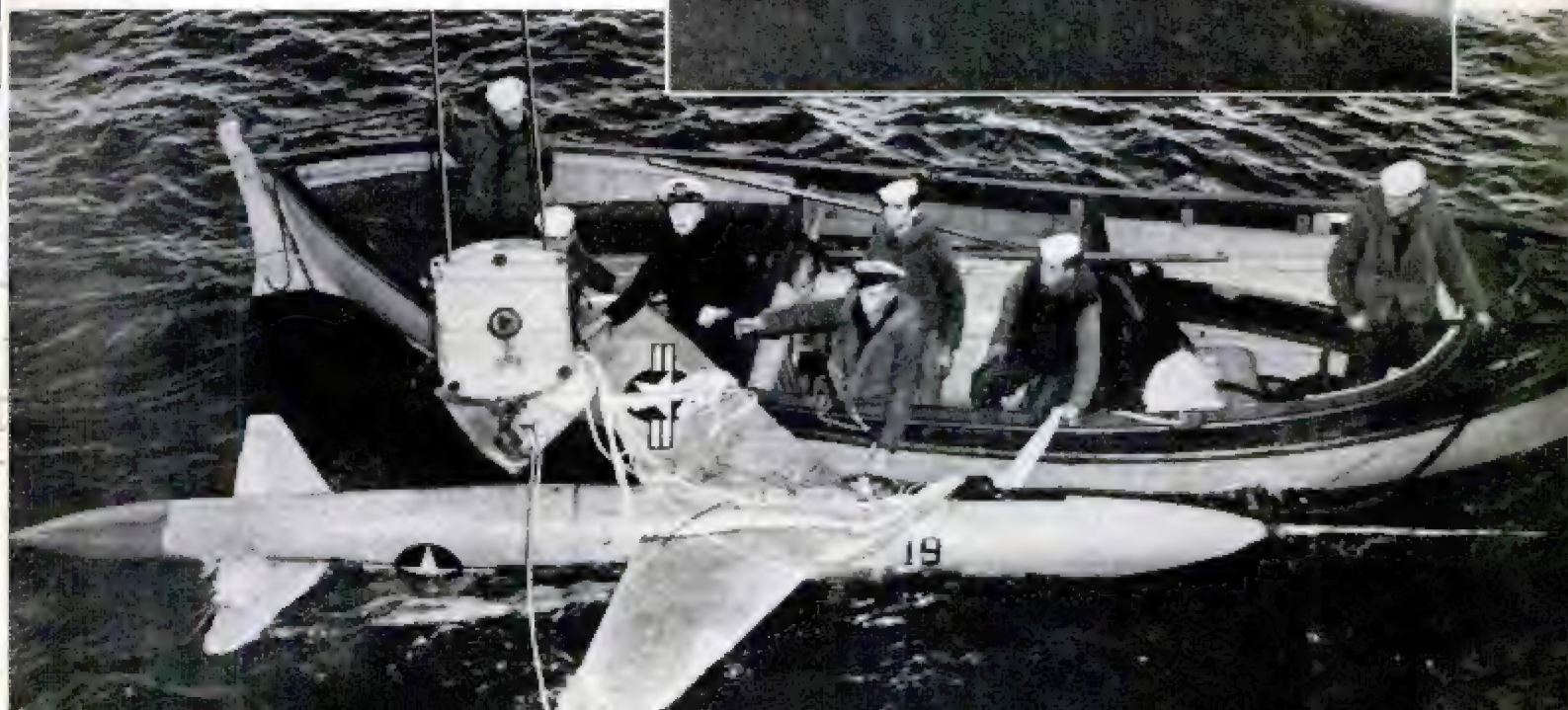
Windrowed crops are turned for quick drying without shelling or loss of leaves by a spring-pronged turner that can be attached to any tractor in a few minutes. Ground-driven, the turner has few parts to wear out. The wheel angle can be adjusted to three positions and also can be set for various sizes and weights of windrows.

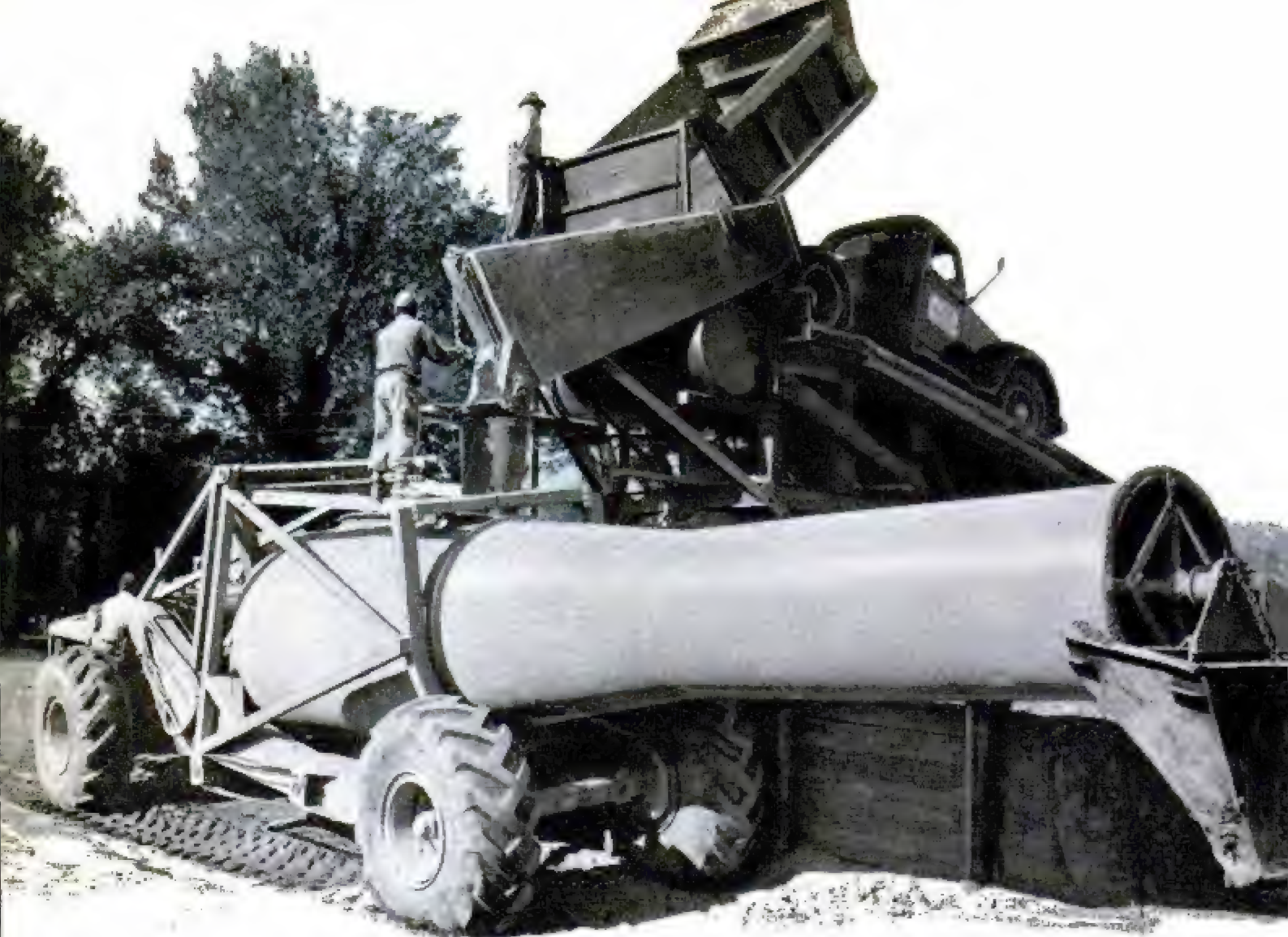
¶There are well over seven million acres of woodland being maintained by farmers of the United States.



RADIO IS TEST PILOT OF "FLYING STOVEPIPE"

Radio waves act as test pilot for the Navy when ramjet engines are put through their paces over the Pacific Ocean. Mounted on a tiny plane that looks very similar to the buzz bombs used by the Nazis, the ramjets are piloted on 10-minute flights by the radio-operated remote-control system. Data is transmitted back to the observers by a complex telemetering device. Since ramjets have no static thrust, they can't take off by themselves. A specially modified Black Widow fighter (top) carries the tiny plane aloft by means of a hanger under its right wing, upper right. Once over the test area, the ramjet is released and from then on it flies by radio control, right. Its flight is followed by radar. When its fuel supply is exhausted, the tiny plane automatically releases a large parachute which brings it down without damage (below), enabling the technicians to examine the engine for any faults that might have developed in flight





Concrete mixer with military profile takes on load of mix from truck which has backed onto the loading ramp

HOUSEBUILDING with a "HOWITZER"

A rear-wall form is lowered into proper position on footing



FOUR CONCRETE home foundations a day are being turned out by a new technique developed by Clarence T. Wilson, St. Louis contractor. Wilson, who is now working on a 400-home subdivision, has put foundation construction on a mass-production basis. He uses a special set of four portable steel forms and a mobile LeTourneau concrete mixer that pokes its mouth over the forms and pours a whole foundation with four fillings.

Each form consists of only eight major pieces, each seven feet eight inches tall. The eight sections, when bolted together into a hollow rectangle, take the place of the handmade wooden forms commonly used. Small steel outlines fastened temporarily between the inner and outer walls of the form leave necessary openings for basement windows and a coal chute.

The steel is coated with used motor oil before pouring so that the forms may be unbolted and easily slipped off after the concrete has set. Holes left by bolts holding the inner and outer walls together are plugged with cement to leave the walls watertight.

The mixer, with its 34-foot drum, resembles a giant howitzer. It is powered and moved about by a two-wheel, 110-horsepower prime mover which also tilts the mixer to raise or lower the muzzle for pouring. The mixer can pour at heights up to 20 feet.

On the inner surface of the drum are helical blades. As the drum revolves counterclockwise, the blades mix the six to seven cubic yards of ingredients while the mixer moves from a nearby loading ramp to the homesite. When the muzzle is in position over the form, the drum is reversed and the blades eject the mix through a swinging funnel into the form.

The mixer, one of four in the country, cost \$20,000, and the steel forms \$36,000. Wilson plans to use the outfit also in laying subdivision streets and basement floors.



Workman helps guide flow of concrete into a wall form. Cut-away section of drum shows helical blades inside. A swinging funnel is attached to mixer

After 24 hours the bolts are removed and a crane lifts the frame from the hardened concrete. Bolt holes are plugged to make wall watertight

Below left, 400 foundations are being poured in one subdivision with the "howitzer" equipment. Right, the finished product—a five-room house



Jet Flying Wing for Carriers Travels Over 600 Miles Per Hour



For shipboard operations the Navy has a new jet fighter which hurtles through the air at speeds over 600 miles per hour. Designated the Chance-Vought XF7U-1, the jet fighter recently completed its initial flight tests. The plane is a flying wing of the swept-back type, and has two turbojet engines. Two vertical stabilizers and rudders are located on the trailing edge of the wing, but longitudinal and lateral control are obtained through a pair of "ailevators"—combined ailerons and elevators. The plane can be brought down to shipboard landing speed by extending two slats in the leading edge of the wing.

Lead-Free Paint Stays White Longer

Entirely lead-free, a new outside paint for homes stays white longer even in industrial areas where sulphurous gases darken white-lead paint by chemical action. Lead paints turn dark when sulphurous gases react with the lead to form lead sulphide which is black. In various places throughout the country, comparison tests of the lead-free paint and white-lead paints were made under adverse conditions. The lead-free paint remained white long after the other paints had darkened. The paint, available in white and colors, can be used on wood, brick and masonry.

These pictures, taken 14 months after the houses were painted, illustrate how the new type of paint resists darkening. First-quality lead-and-oil paint was used on house in upper picture. The lead-free paint was used on lower house. Panels at extreme right are close-ups of sidewalls





rhythm in roots

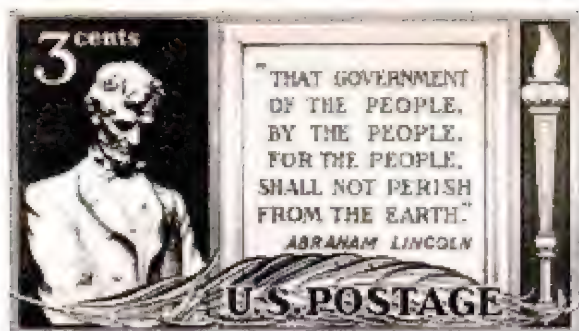
Nature is a fine sculptor, according to W. G. Hodgson of Dorothy, Alta., Can., who says he merely puts the finishing touches on Nature's artistry. Collectors on this continent, in England and Australia would dispute his word, though, for they claim the figurines he carves from juniper roots show the hand of a craftsman who has a fine imagination. Hodgson selects the twisted roots for grain and coloring, then lets the shape decide the nature of the finished figurine. His homemade tools produce weird but rhythmical effects. Hodgson finishes the figurines with "linseed oil and elbow grease—plenty of the latter."

Above left, wood sculptor selects a gnarled juniper root for a carving. Above, finished figure follows the lines of the root, giving a weird but rhythmical effect



Left, Hodgson makes his tools from bits of well-tempered steel. Ordinary tools wouldn't last long because the wood is so hard. Below, coloring and grain give the root graceful lines. Right, the sections of root are seasoned before they are shaped roughly for a carving





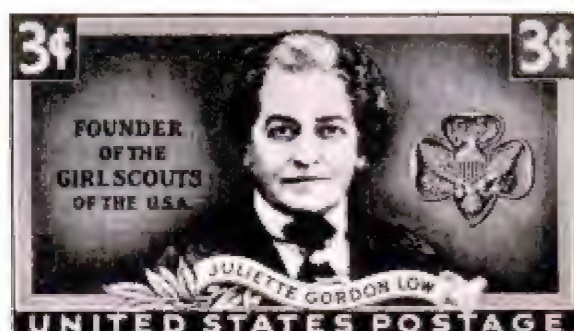
Carl T. Arlt, veteran stamp maker, puts finishing touches on his engraving of the Fort Kearny stamp

Uncle Sam's Stamp Factory

By Wayne Whittaker

THE THIN FELLOW you saw in the post office the other day with that worried look might well have been one of the millions of stamp collectors in this country. He has had a harrowing year—1948—trying to keep track of the special stamps that have rolled from the presses in the U. S. Treasury's Bureau of Engraving and Printing, Washington, D. C.

The last Congress may go down in history as the "Stamp Act" Congress. By congressional authorization, its members sponsored a new stamp on the average of every other week in 1948. Stamp dealers





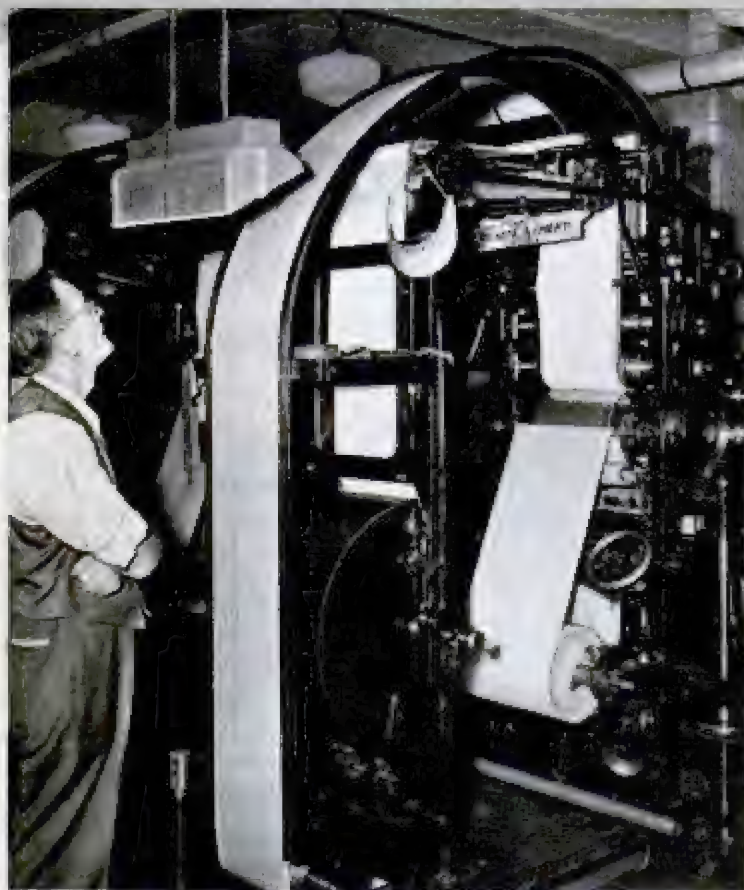
Winding machine cuts the stamp rolls into strips to fit stamp machines. Big single coil has 3000 stamps

groaned. Stamp collectors groaned. Officials of the bureau groaned loudest of all, but Congress went happily on its way paying tribute to everything from the poultry industry to the Gettysburg Address.

The bureau has the big job of turning out some 20 billion postage stamps a year, (stamped envelopes are subcontracted) and billions of federal tax stamps such as are found on packages of cigarettes, playing cards and many other items.

The special postage stamps are called "commemoratives." In years past, the commemoratives have been issued by the authority of the Postmaster General who also is empowered by law to revise postage-stamp designs. Much fanfare accompanies the issuing of a commemorative and the stamp goes on sale the first day at a significantly located post office. For example, the U. S.-Canada Friendship stamp had a first-day sale at Niagara Falls, N. Y.; the Will Rogers stamp at Claremore, Okla., and the William Allen White stamp at Emporia, Kans. First-day covers, coveted by



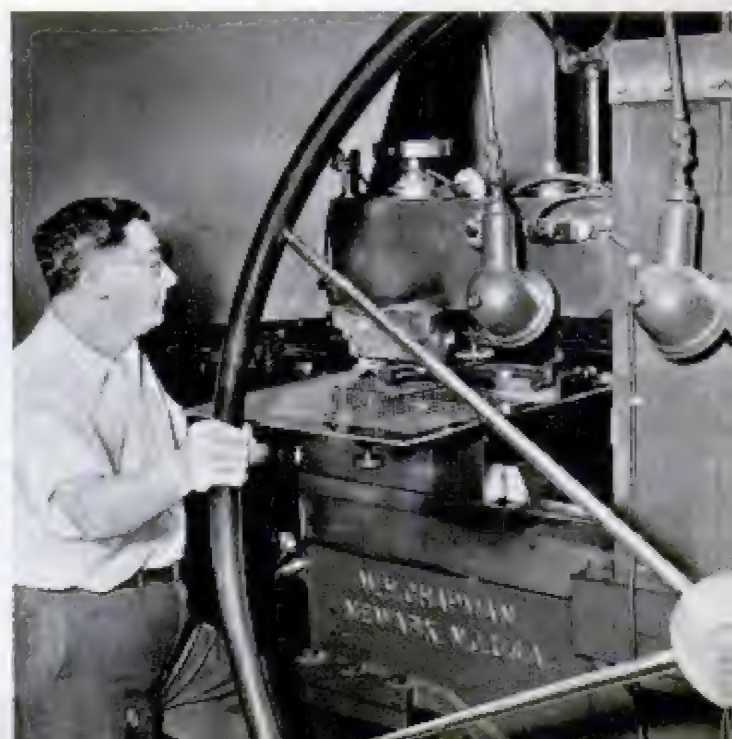


Most stamps are printed on specially designed rotary presses like this one. Below, hardening plate in cyanide bath. Right, reproducing stamp engraving on steel plate which will be bent to fit press
Photos by John Drew Allen

stamp collectors, mailed from these post offices usually number about 450,000. This often means the organization of a special staff and weeks of preparation for the big day. The initial printing order for commemoratives is usually 50 or 60 million.

Sometimes sales of a special stamp are boomed by an unpredictable idiosyncrasy. When the three-cent Pony Express commemorative came out in 1940, somebody discovered the pony on the stamp looked like Seabiscuit, the famous race horse. This caused a furor among collectors and a rush to acquire the stamp. Then there was the two-cent Grand Canyon stamp back in 1934. A newspaper carried the story that if the stamp were held sideways one could see a perfect profile of Mussolini. The rush was on.

If anyone thinks that getting out a commemorative, or any other kind of stamp, is a simple operation he is dead wrong. The procedure on the commemoratives ordered by Congress goes like this: The congressional authorization is sent to Jesse M. Donaldson, postmaster general; he sends it along to Alvin W. Hall, director of the Bureau of Engraving and Printing, who relays the order into the proper chan-





Right, fitting bent plate to the rotary cylinder is an exacting job. Plate holds 200 big-size stamps

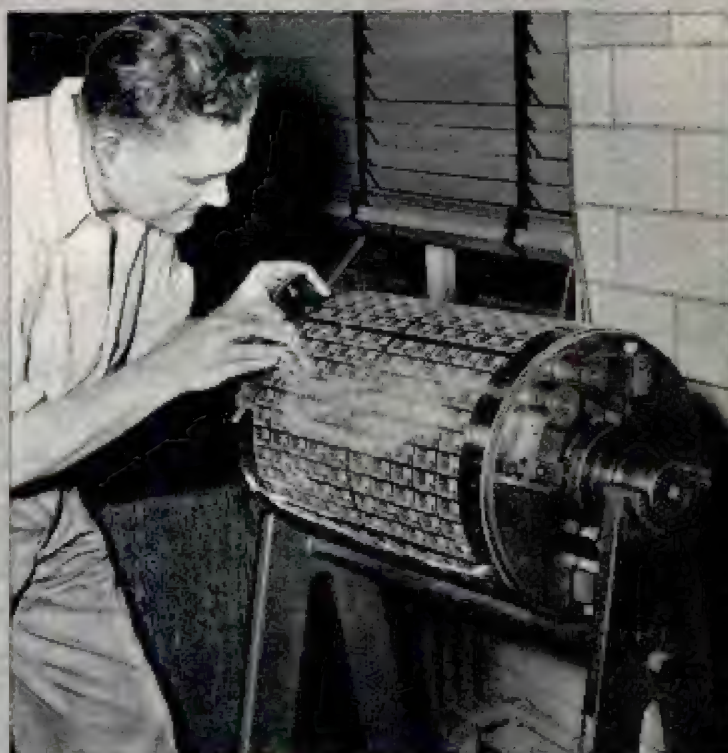
nels for processing in the postage-stamp division and engraving department.

One of four designers in the bureau (who also design all remakes of paper currency such as the new \$20 bill with the Truman back porch on the White House) makes the layout for the new stamp. This is simplified if the Post Office Department has sent along subject material for the design. In the case of the Volunteer Firemen's stamp, which came out last October, a portrait of Peter Stuyvesant, founder of the organization, was submitted. All the designer had to do was secure a picture of one of the earliest fire engines in this country from the Library of Congress to use on the stamp with the portrait.

The designers get much of their material from the Library of Congress, but even this institution occasionally fails them. When William K. Schrage was working on the Fort Kearny stamp he was surprised to discover there was apparently no photograph of the early Nebraska fort anywhere to be found. After days of searching, the Army War College Library came to the rescue with an old photograph of an original sketch. This saved the day and the stamp was drawn up with the fort and a reproduction of a covered-wagon scene from a sculptor's group over the doorway of the capitol in Lincoln, Neb.

After the design has been scrutinized by Donald R. McLeod, superintendent of the engraving division, or his assistant, James T. Vail, it is then reduced to stamp size by photographing. This photo is submitted to the Postmaster General for an O.K. When the design has been approved, the original drawing is sent along to Carl T. Arlt, veteran foreman of the picture-engraving department. It takes about 120 to 130 hours to make the steel engraving which, of course, is the actual size of the stamp and is known as the master die. The

(Continued to page 262)





Hell's Canyon Mailman

By Thomas E. Stimson, Jr.

the swift turbulence of the river, but today McGrady carries mail, passengers and cargo 100 miles upstream from Lewiston, Idaho, twice a week on schedule.

Sheep and cattle ranchers along the river depend on McGrady to bring them provisions and other necessities. Trappers and prospectors use the boat to reach country that is virtually untouched. Tourists who pay \$17.50 to ride upstream, returning the next

KYLE McGRADY figures that pigeons can deliver messages to places that radio waves can't reach and so this spring he will carry half a dozen homing pigeons on his boat, the Florence, every voyage.

McGrady is known as the "Mail Carrier of Hell's Canyon," the man who licked the Snake River and turned an adventurous boat ride into a routine run. Early explorers and the first settlers who ventured into what is now western Idaho were balked by

day, get a spectacular trip that they never forget. McGrady lost one boat when learning the river—now he knows just how to handle the Florence on every stretch of white water.

The riverman needs his pigeons because the Snake foams and tumbles through Hell's Canyon, the deepest abyss in the United States and possibly in the world. Broadcasts from a powerful radio station 80 miles away don't raise a whisper in a

Burro-mounted tourist waves goodbye to the Florence and crew on return trip to Lewiston. On opposite page a dismantled wagon is being loaded on Florence for delivery to a ranch up the river while tourists look on





receiver at the bottom of the tremendous rift.

For 40 spectacular miles, the great V-shaped gash has an average depth of 5510 feet. Though it doesn't have walls as precipitous as those of the Grand Canyon of the Colorado, it is 7900 feet deep at one point as compared to a maximum depth of 6100 feet in the Grand Canyon. The Catskill Mountains could be put down intact in Hell's Canyon and their tops would still be 1500 feet below the rim.

McGrady doesn't traverse the length of Hell's Canyon, but he enters well into it. If he put a transmitter on his boat, the signals would fade out within a few miles. Yet occasionally he wants to send some routine message and he never knows when an emergency will occur and he will need to call for help, quick. That's why he is trying pigeons this year. If the canyon hawks don't get the birds, he'll be able to communicate with the outside for the first time. There's even a chance that he can train some of the birds to seek and land on the moving boat. Then he'll have two-way communication.

The Snake is one of the great rivers of the United States and carries more water than does the Rio Grande. It is part of the Columbia River system. The Snake has its beginning in Wyoming, winds across southern Idaho, turns north to form part of the Idaho-Oregon border, is joined by the Salmon, then moves west again to enter the Columbia.

Through southern Idaho the river is mild and tractable, but when it turns north into the mountainous Seven Devils region it becomes an "eighth devil." The gradient becomes steeper and the river picks up speed. A few adventurous rivermen, including McGrady, have run the Snake all the way down through Hell's Canyon in small boats. McGrady did it twice but once has been enough for the others. The Florence goes up into Hell's Canyon only as far as Johnson Bar. This is the present head of navigation.



Kyle McGrady is training pigeons to carry messages from Florence because radio waves do not penetrate to the depths of Hell's Canyon route

Lower left, Skipper McGrady shows big sturgeon to tourists on Snake River trip. Stream abounds in sturgeon caught by tying bait to end of rope

In addition to his skill as river navigator, McGrady pans gold during long waits along the river route. Here he is demonstrating to passenger





McGrady's specially built flat-bottomed Florence is 60 feet long, 12 feet wide and has a draft of $3\frac{1}{2}$ feet. The steel hull has twin rudders and a sharp underwater bow. It is powered by two 165-horsepower diesels.

That's a lot of power and yet the pilot needs every bit of it to fight his way upstream against the 8 to 10-knot currents and to climb the 510 feet that the river rises en route to Johnson Bar. He needs the sharp nose and the twin rudders for holding the craft steady in the rapids, some of which have waves that stand five and six feet high.

There are more than 100 rapids in all, of which Pleasant Valley Rapids is the worst. Here the river drops 27 feet in 3000 yards of white cascade. Wild Goose and Zigzag are almost as bad and each must be run in different fashion. Not only does the riverman have to know the idiosyncrasies of each stretch of water but he has to handle the boat differently at various water stages, and the depth of water varies with the season.

It takes a long day to go from Lewiston to McGrady's camp at the head of navigation but next morning, after an overnight sleep and a big breakfast, it's only a four or five-hour run back to Lewiston. The Snake is a huge "shoot

Busy scene at stop along the river where ranchers pick up cargo ordered weeks ago. Goods for ranchers vary from a paper of pins and toys to tools and machinery





Cameras are much in evidence among tourists on Snake River trip; one passenger is taking notes on typewriter

the chutes" for a boat going downstream. Passengers hang onto the rail as the vessel slides over the rapids and around the bends at 20 to 30 miles per hour.

The Florence has a capacity of 10 tons of cargo or can carry 50 passengers plus some freight. Several dozen families live up the river and all of them depend on McGrady and his boat for the necessities and incidentals of life. McGrady brings them their mail, pays their bills, delivers their gold dust to the buyers, collects regular pension checks for some of them, and delivers their groceries.

Food is the most important item of cargo on the upriver trip and most of the food is made up into packages of the correct size for tying to the backs of pack animals. Usually, a rancher who expects a shipment meets the boat at the riverbank with a string of horses or mules. Otherwise McGrady leaves the packages on the bank. No one will disturb them.

Sacks of grain and other stock feed go upriver to the ranches; cookstoves, machinery, children's toys and building materials are other common pieces of cargo. Over a number of trips the riverman has delivered all the materials for three houses including lumber, bricks and cement. He

transported upstream all the equipment for his own camp, including sleeping tents, a dining room and kitchen, a lighting plant and saddle horses. The river is the sole highway into the region and the only other ways to get in or out are by airplane, by horse or on foot.

On the downstream trip, McGrady picks up some ranch produce for market, most of this being wool during the shearing season. He makes one trip a week during the winter, then with the coming of spring he goes upriver every Wednesday and Saturday. He hauls as many as 2000 passengers a year, most of whom are sightseers. Low water forces him to tie up during August and part of September, but this year he hopes to put a 15-passenger boat in operation that can make the trip at any time. Eventually, five of the worst parts of the river are to be blasted out and improved by constructing wing dams so that the boats can travel upstream more easily during low water.

Some of the tourists go along for the ride and they all get their money's worth; others go for the hunting and fishing. During the hunting season no one has any trouble in getting a deer. The hunter simply picks the side of the river for which he holds a license



—the east side for an Idaho license, the west side for an Oregon license. Bear, cougar and small game abound and the river is a fisherman's paradise.

Those who want really big fish tie bait to a six or eight-inch hook and secure the hook to a heavy rope. Equipment like this, thrown out into the stream in the afternoon, can be expected to catch a Snake River sturgeon by morning, a fish that is apt to run six or seven feet long and weigh 150 pounds. A few specimens of this boneless fish have measured 12 feet in length and have run as high as 300 pounds. Once sturgeon eggs were shipped to New York as caviar, now the fish may not be taken for commercial purposes.

On both sides of Hell's Canyon are primitive areas, unspoiled as yet by civilization. Even more rugged and untouched is the wilderness country of the Salmon River in central Idaho. The Salmon is one of the principal tributaries of the Snake and joins the Snake a short distance above Lewiston. Its name comes from

Sportsmen on Salmon River use big steering sweeps to guide a scow through the dangerous rapids. Below is drawing of highest dam in world proposed for plugging Hell's Canyon. The dam will create a 4,400,000-acre-foot lake and will be 740 feet high





In upper Hell's Canyon, Snake River runs wild and can be ridden only in small boats. Note life jacket

the fact that Pacific Ocean salmon fight their way upstream from tidewater some 800 river miles away to spawn in its upper reaches. The Salmon is the famous "river of no return" down which adventurous rivermen and sportsmen have traveled by flatboat or skiff, but it is too swift and turbulent for returning upstream.

The Salmon River wilderness is larger than Massachusetts, Connecticut and Rhode Island combined. Elk, moose, mountain

sheep and deer abound. A few trails and dirt roads penetrate into the wilderness but no road crosses it. The "river of no return" is the only thoroughfare.

Several groups of sportsmen make the trip every summer on the City of Salmon, a 30-foot flat-bottom barge that is propelled through quiet stretches of water by a large outboard motor. The barge is guided by two tremendous sweeps, one at the bow and one at the stern. Don and Clyde Smith, who have lived along the river for 16 years, operate the vessel. They tie up at some convenient spot at night, then carefully guide the scow down through more white water and rapids to the next camp. Fishing and taking it easy along the way, each party spends a week on the river, moving down to the Snake and following that river as far as Lewiston.

The Salmon River country has been dedicated as a permanent wilderness area and both it and the river are to be left untouched. The Snake, however, eventually is to be tamed by a huge concrete dam that will be built about half-way down Hell's Canyon.

Two 165-hp. diesels power the twin screws of the Florence. The oversize twin rudders aid steering in rapids



"Cake Icer" Trims Ceramics With Colored Glazes

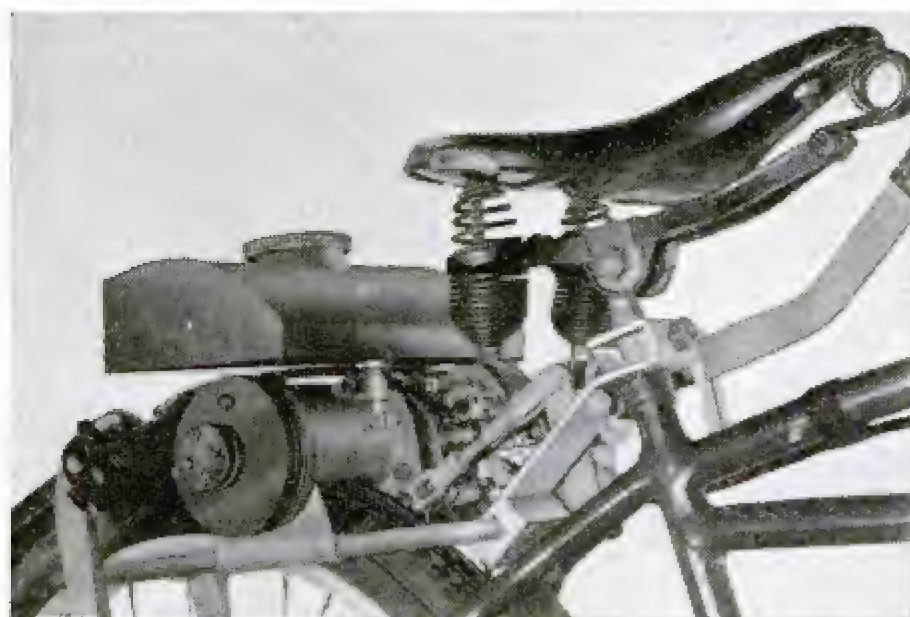
Almost like icing a cake, a method of applying various colored glazes to ceramic tile uses rubber bulbs from which coloring is squeezed to form the pattern. Each bulb contains a different color. After the design is completed, the tiles are baked and then assembled for decorating bathroom and kitchen walls.

Mold Discovered on Photo Combats Influenza Virus

Mold that formed on a photograph in the tropics has been found effective in combating the swine-influenza virus—a virus that is almost identical to the influenza-A virus which affects humans. While in the Navy on Guam in 1945, Commander Richard E. Shope noticed mold growing on a



photograph. Doctor Shope brought the mold strain back to the United States and developed it in broth. Experiments on rats showed it to be effective against the virus.



Rear Bicycle Motor Eliminates Fumes

Mounted above the rear wheel, a streamlined bicycle motor can't throw heat and fumes into the rider's face. The new motor is easily fitted on any standard bike. It is made of aluminum and weighs less than 15 pounds. Operating on a magneto, it provides speeds up to 29 miles an hour. Only two controls are required, the gas control on the handle bar and the clutch on the frame. The mechanism is enclosed in a streamlined hood mounted on a frame just behind the bicycle seat. The motor powers the bicycle through a roller mechanism and a free-running clutch which eliminate most of the tire wear.



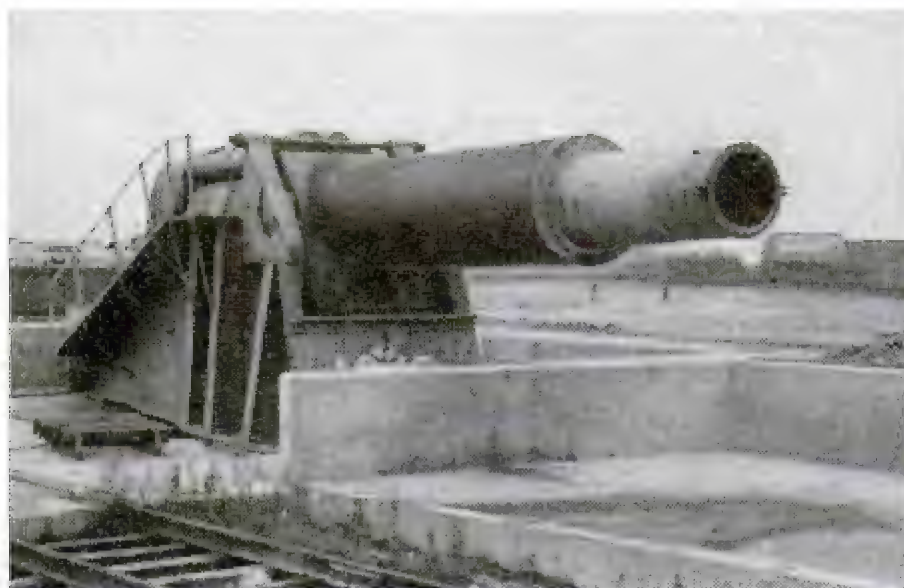
Multi-engine airliners can be made to descend 10,000 feet a minute by reversing the thrust of the propellers in flight, thus providing a means of making fast emergency landings from the high altitudes at which these planes fly.



Overpass for Aircraft

Airplanes and automobiles are kept safely apart even though their paths intersect at New York International Airport by means of a two-level intersection,

said to be the first ever built for aircraft. Two bridges span the roadway, each capable of supporting a 300,000-pound plane. The overpass permits the uninterrupted flow of vehicles into the airport while planes taxi to and from the loading ramps.



Rebuilt Naval Gun Tests Ton Bombs

Largest known weapon of its type, a 24-inch test gun hurls bombs and warheads weighing up to 2000 pounds against armor plate and concrete targets. The new gun permits ballistics experts to analyze the impact of a new missile on its target and on the missile itself. The gun is basically the sawed-off barrel of a standard 16-inch naval gun, damaged in combat.

Plane Servicing Speeded by Single-Point Refueling System

Greater flying safety and servicing speed result from a continuous-flow fuel system for planes developed at Wright-Patterson Air Force Base. The system provides automatic flow from all tanks to all engines instead of requiring pilots to switch tanks in flight. In case of failure or damage, an engine or part can be shut off manually from the rest of the system. The new single-point refueling feature makes

it possible for one man and a truck to fill a B-29 in 30 minutes. Now it takes 13 men with four trucks 45 minutes to do the job. The system, devised by Capt. David Samiran, who has contributed over 34 inventions to the government, is currently being put in B-36, B-45, B-40 and XB-52 planes.

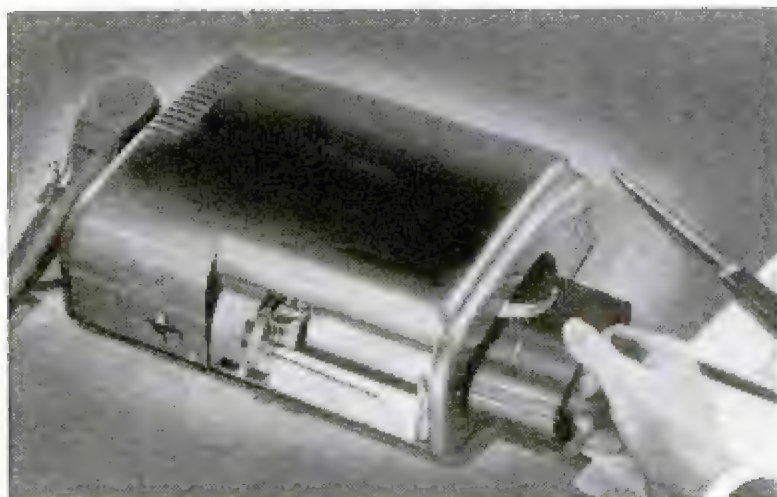
■ National forests in this country now cover 179 million acres.

Jet-Powered Bike Travels 70 M.P.H.

Burning ordinary automotive gasoline, a jet engine for commercial use has been installed experimentally on a motorbike which scooted along at more than 70 miles an hour. The miniature jet develops a static thrust of 30 pounds, yet weighs only $8\frac{3}{4}$ pounds. It is a little over six inches in diameter and 51 inches long. No fuel pump is required as the intake air velocity performs the pumping function. The engine is started with a vibrator coil and air from a small compressed-air tank. It will be used initially for experiments in helicopter and airplane-engine laboratories



but later may be installed as a stand-by power plant for gliders and as a power source for racing cars and boats.

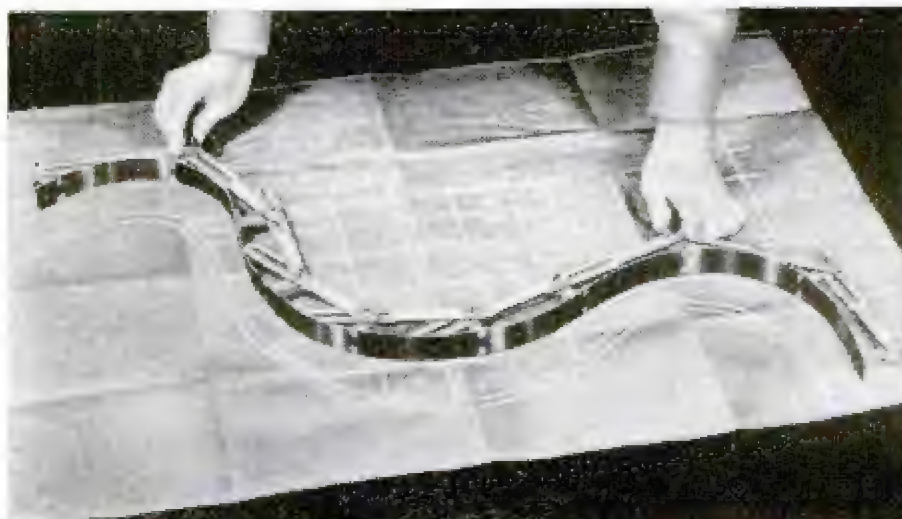


Endless Plastic Belt Records Dictation

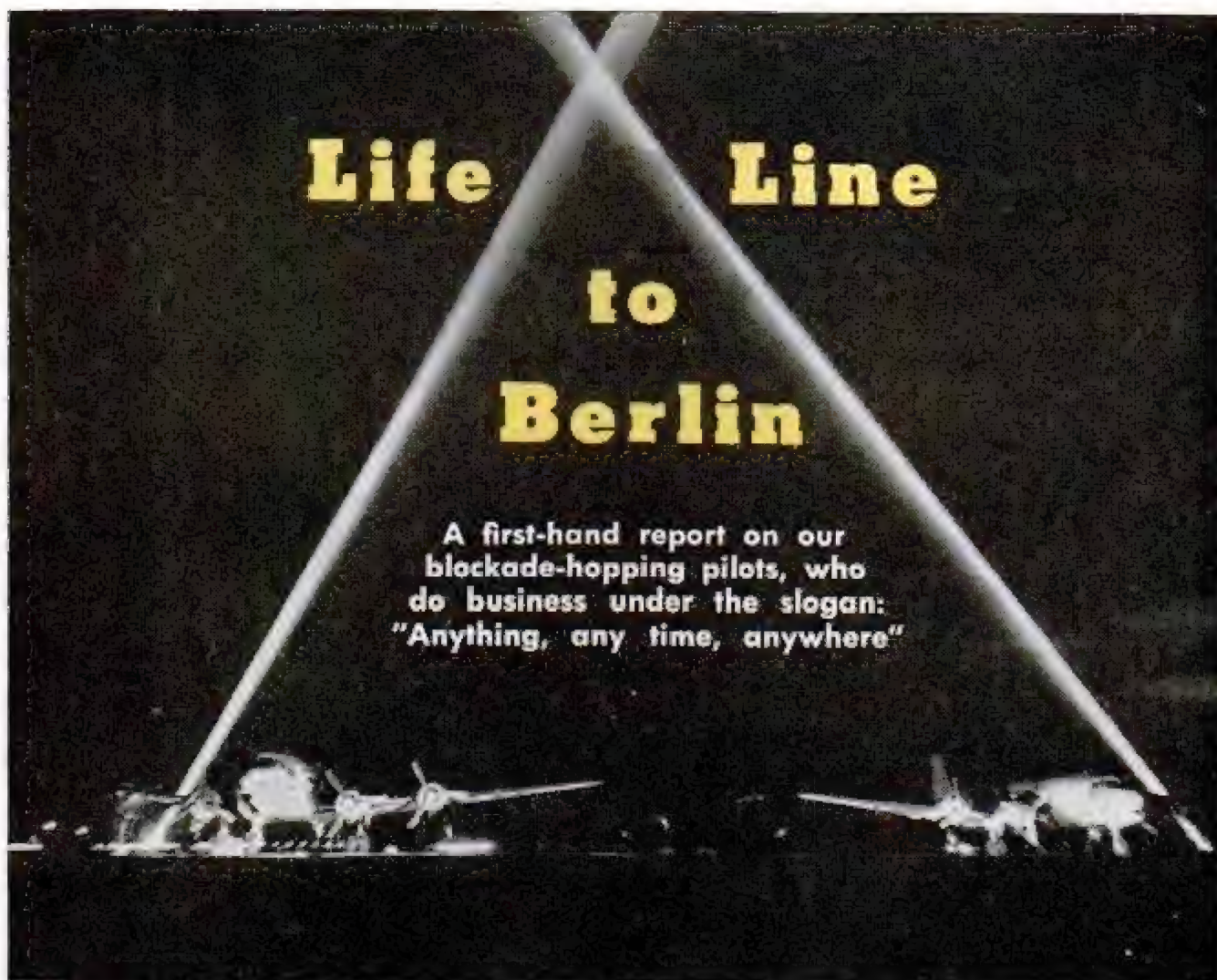
Up to 15 minutes of dictation can be recorded on a new plastic record made in the shape of an endless belt. The recording is permanent and can be played back or filed for future use. Five of the endless belts, one nested within another, can be mailed in a small business envelope. The dictating machine is slightly larger than a standard letterhead and weighs only 20 pounds.

Flexible Template

Complex curves in construction materials can be duplicated in a few seconds with a flexible template that eliminates curve-plotting, drawing and template-making. The layout tool is a strip of spring steel with sliding arms and wing nuts on one side. Curves can be copied directly from blueprints or from existing installations that must be duplicated. The steel strip is bent to conform to the curve and locked into place with the wing nuts. It then may be moved anywhere to duplicate the curve. When the nuts are loos-



ened, the template springs back to its original shape. The tool is useful for bending pipe, curving conduit, inlaying linoleum and copying glass curves.



THIS HAD BETTER **By Aubrey O. Cookman, Jr.** be it!"

Lt. Kyle E. McMichael of Houston, Tex., was in no mood for further delays as he gunned our Berlin-bound C-54 down the runway at Rhein-Main Air Force Base at Frankfurt, Germany.

It was past noon as the big plane finally

nosed upward—and the fifth time we'd been poised since eight o'clock that morning, waiting to pierce the thick winter fog hanging 150 feet above ground. Each time, with four powerful engines roaring impatiently at the delay, Operations had held us off, explaining either that our weather or Berlin's had closed down below safe minimums.

At the clearest you could see not more than a quarter of a mile ahead. My jeep driver got hopelessly lost on the taxi strip, just trying to find the plane. Occasionally a light drizzle fell.

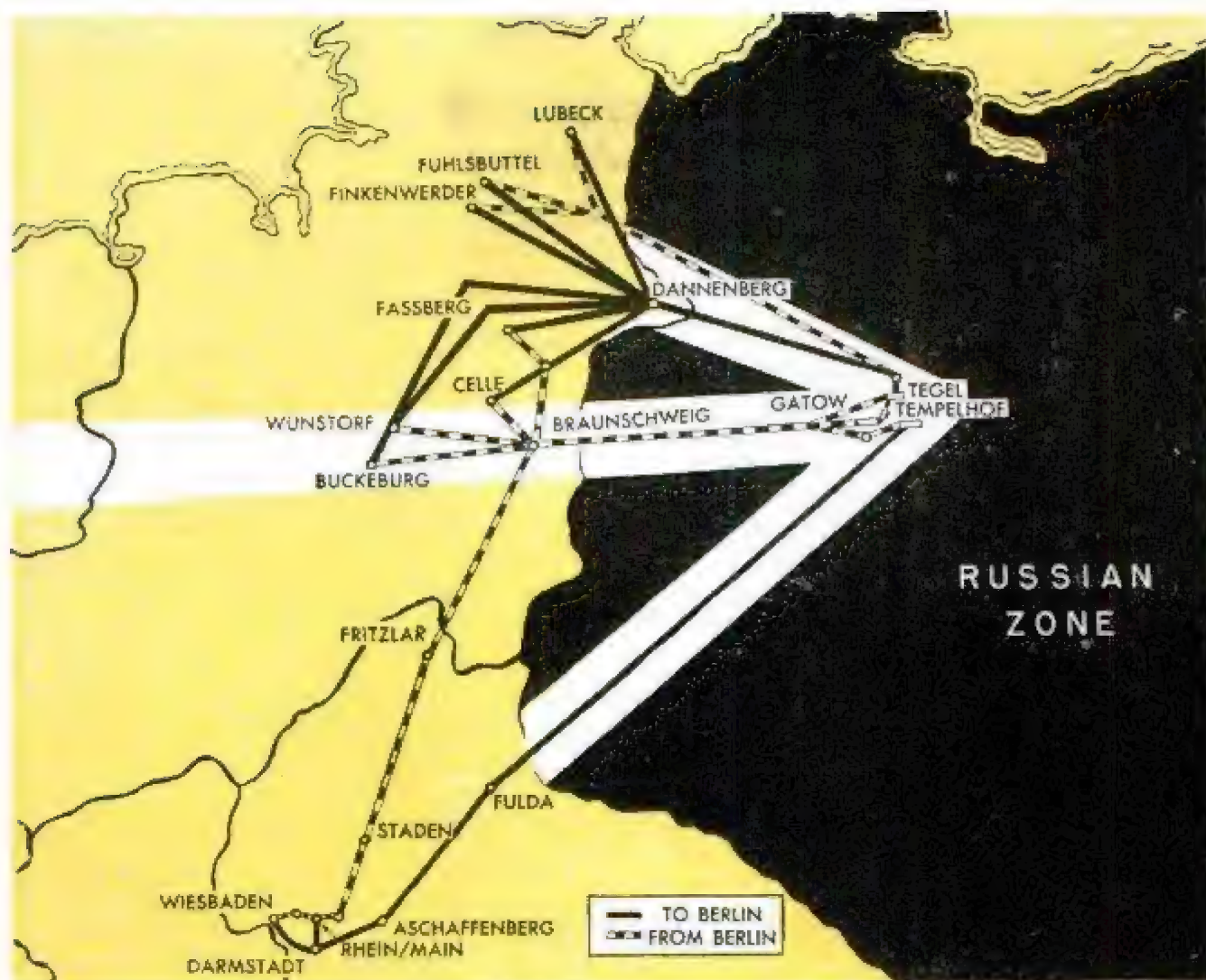
But this time, racing against fickle weather that might close our door to Berlin at any moment, we pushed up through the murky ceiling. Our plane was the first of a long line to take off. Our pilot instantly called Operations: "Hit the top at 1500 feet. OK here."

We had climbed above the fog blanket to clear skies overhead. Only 270 miles lay between us,



U. S. Air Force photo

Editor Cookman, just arrived by plane from Chicago, talks over Vittles' problems with lift's commander, Maj. Gen. W. H. Tunner



our 10-ton cargo of flour and potatoes, and Tempelhof airfield in Berlin.

Everything but the weather had cooperated smoothly to bring me in 10 days from my desk in Chicago to the heart of the greatest air-freight operation the world has ever known—Operation Vittles. An invitation from the U. S. Air Force to fly on the lift; cabled permission to enter the area from Gen. Lucius D. Clay, military governor of the American zone in Germany; a day in Washington for briefing and picking up my passport, and I was on my way.

Tail winds and a fast-flying airline Constellation moved us in 13 flying hours from New York, through Gander, Newfoundland, and Shannon, Ireland, to London. The ride was exceptionally smooth. Reading, eating

In arrowlike pattern pointed at Berlin, lift flows in and out of blockaded city along three air corridors. Traffic from the British zone uses the upper one, while U. S. craft fly lower two. Below, rows of high-intensity approach lights, like the one on tower at left, mark path into Tempelhof





Barges heaped with coal dumped from trucks above prepare to set out for ports in Berlin area. Left, below, a German frau gets part of her coal ration from air lift's stockpile. Right, unloading fresh milk from Denmark



and napping proved more exciting than flying the ocean to 1949 model passengers, so the "worry" of getting our craft across the big pond was left completely to the crew.

Bad weather that was soon to be a constant companion made its first appearance at London, blotting out all air traffic to the continent for three days. The "Great Fog," as a London newspaper labeled it, was gaining stature as the longest lasting and most widespread in Europe's recent history. There were disputes as to whether pedestrians could see ten or only five feet ahead. Flying was out of the question.

Finally, after a train trip north to an RAF base on the fourth day, I was able to catch a flight on an American courier C-47 returning to U. S. Air Force's European headquarters at Wiesbaden, Germany. More important to my mission, Wiesbaden is also the operational nerve center of the Air Lift Task Force.

At 5000 feet, moving away from fog-covered Rhein-Main at a comfortable 170 miles an hour, we quickly passed over the Darmstadt and Aschaffenburg radio beacons. A short way on, at the Fulda radio range station, we veered to the right and headed straight down the 20-mile-wide air corridor



Gen. Lucius D. Clay, center, military governor of American zone, inspects model of plane-truck-rail operation at Fassberg. Clay ordered lift's start when Russia halted surface access to Berlin



Placing and tying down of loads, like coal sacks above, is done by experienced air-cargo handlers. Below, flour sacks "chuted" down from belly hatch of giant C-74, are hoisted on trucks at Tempelhof





Loaded trucks at Fassberg await signal over loudspeaker to move forward with cargo for Berlin-bound planes

over 190 miles of Russian-held territory for Berlin.

As the only passenger, I sat up front with the crew, listening on an extra set of headphones to the instructions and banter passing back and forth between flyers and ground stations. Most of the pilots jokingly refer to themselves as "drivers" and to the operation as the Rhein-Main, Wiesbaden or Fassberg "Coal and Feed Co." Once in a while we'd hear recorded music broadcast from American stations in Germany.

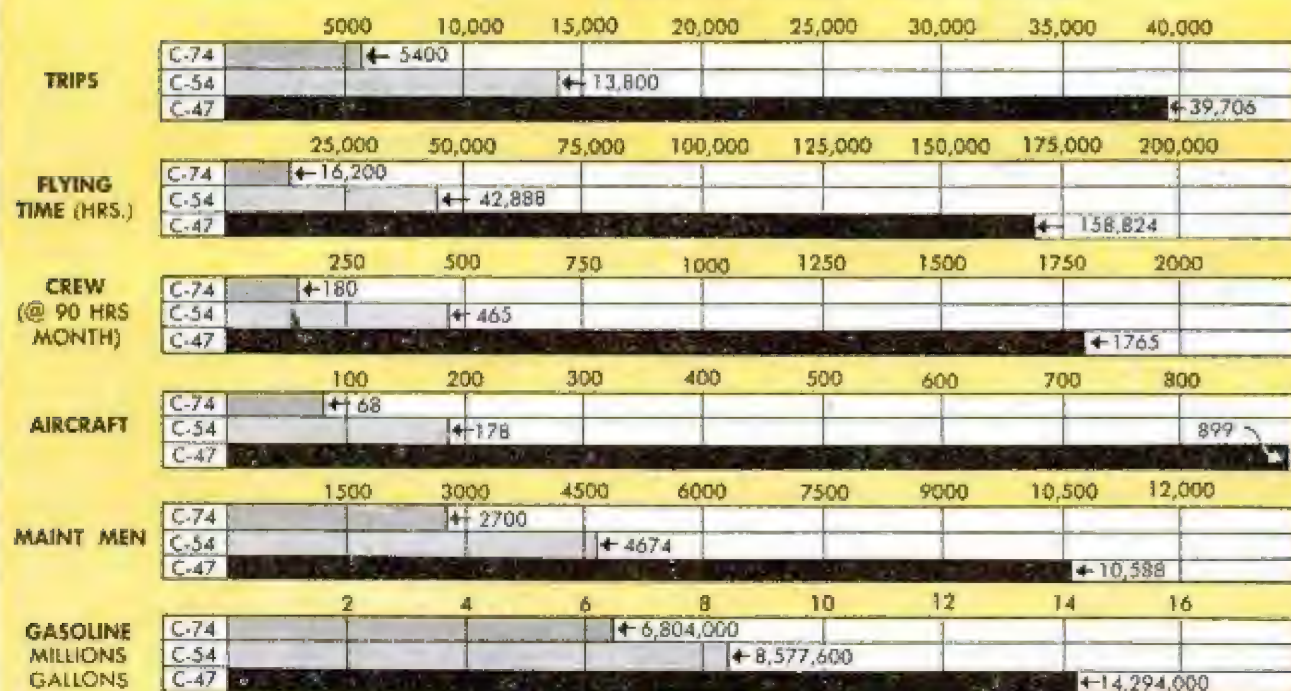
Morale is generally good. It got a boost

when the first relief crews began arriving in December, replacing the originals who often worked stretches of 20 hours and more when the lift began. Now, it has leveled off to where each man flies a maximum of 90 to 110 hours a month. That doesn't include time devoted to ground duties. Crews flying out of Wiesbaden and Rhein-Main get in two round trips a day. On the shorter Fassberg Corridor they can make three.

Through low-hanging clouds we caught occasional glimpses of Soviet airfields.

Chart illustrating how Operation Vittles flying would be simplified if big cargo planes, such as Douglas C-74, were available in sufficient numbers. A C-74 has carried more than 170,000 pounds, but there are only 12, eight of which are being modified. Both the C-47 and 54 were designed in mid-1930s for passenger use

Comparisons . . . C-47, C-54 and C-74 FOR AIR LIFT TO BERLIN (4500 TONS DAILY FOR 30 DAYS)



FACTORS: 3.4 TONS FOR 4-HR. ROUND TRIP BY C-47 C-74: 25 TONS FOR 3.0-HR. ROUND TRIP
9.7 TONS FOR 3.3-HR. ROUND TRIP BY C-54



Most of its wartime bomb damage repaired, Tempelhof is the hub of U. S.-lift operations in German capital

Only a few parked planes dotted the landscape and there was no sign of activity. Apparently the second C-54, a few minutes to the rear in the lift parade we had just resumed, was the only thing flying within 15 miles of us. By the time Germany's war-shattered capital loomed below, the weather had cleared enough for us to follow visually Tempelhof's precise landing pattern. Our wheels touched just one hour and forty minutes after take-off.

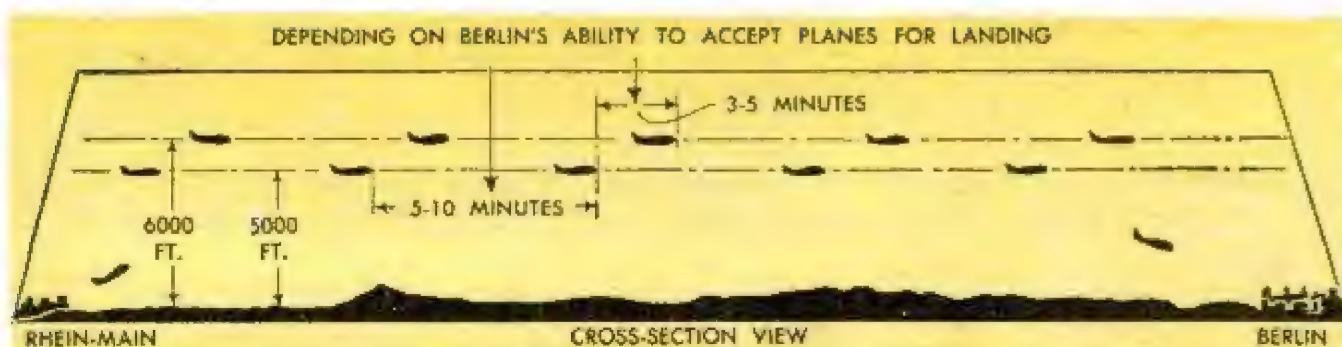
A jeep with a large yellow and maroon "Follow Me" sign on the rear popped into view and we obediently followed. Lieutenant McMichael pulled up at the end of a nose-to-tail line of five inbound planes from the British lift base at Fassberg and cut the engines. Before the propellers had stopped whirling, our crew chief-engineer, Staff Sgt. Roy Farris of Weatherford, Tex., opened the cargo doors and a 10-ton truck

began backing up to receive our offering.

Before McMichael, copilot Lt. Dean Adams of Mt. Pleasant, Mich., and I were out of the plane, a crew of German laborers began undoing cargo tie-downs and loading flour and potato sacks into their truck. Two more jeeps pulled up outside. One carried a maintenance crew, ready to iron out minor mechanical ills, and in the other was a meteorologist bearing a full weather report for the trip back to Rhein-Main. It was service and efficiency that would make stateside airmen pinch themselves in wonder.

A final touch was a mobile canteen serving hot foods and drinks not more than 20 yards away. It was the logical supplement to an order that lift crews can't leave the orbit of their aircraft. Tempelhof's assembly-line mode of operation, like that at other Vittles fields, can't afford to be thrown

Like coaches of aerial trains, inbound planes fly at two levels, separated vertically by as little as three minutes in good weather. Their airspeed indicators are regularly calibrated to insure a universal 170-mile-an-hour pace. During instrument weather, interval between planes is lengthened to avoid traffic jams over Berlin





Children seated on brick rubble look on curiously as bulldozers and trucks work on new lift strip at Tegel

out of gear by wandering flyers, even hungry ones. When a plane is unloaded and ready to fly it goes, or else . . .

From small beginnings the Berlin air lift has snowballed into a tremendous and complex operation. It started June 26, 1948, after Russia closed off all rail and highway access to Berlin from the west. General Clay quickly responded by giving to the Air Force what was then thought to be a temporary assignment of flying in sufficient supplies for 2½ million Berliners and occupation personnel.

Hurriedly assembling at Wiesbaden all the planes and crews they had available in Europe, the Air Force moved 80 tons into Berlin the first day. Most of that was milk for children, flour and medicine. It seemed like a lot, then.

To supplement the original force of 110

Douglas C-47s, dependable but small planes designed in the early thirties for passenger use, emergency cables went all over the world for bigger aircraft and more crews. Missions were figuratively halted in midair and rerouted to Berlin. A pilot parked his brand new Hudson at an airfield near Austin, Tex., and hopped into a lift-bound plane. The keys still jingled in his pocket as he flew in and out of Berlin.

Vittles quickly grew from a sub-activity to a separate task force. Heading it now is Maj. Gen. William H. Tunner, a specialist in air transport who directed wartime freight flying over the Hump in China. Partners in the work are the British and the French. They are committed to lifting about one fourth of the 4500 tons required daily, using the shorter northern corridor from Fassberg to Gatow. The French are responsible for unloading and loading at Tegel.

The first day's 80 tons have skyrocketed to a 24-hour period high of almost 8000 tons, brought in on 895 flights. In the first six months 717,962 tons of supplies went into Berlin. During good-flying periods authorities have been able to stock-pile some items against possible future shortages.

Successors to the pioneer 110 small planes are 335 aircraft, most of them four-engine C-54s carrying 10 tons, more than

Not even hunger is allowed to slow Operation Vittles. Mobile snack bar operates near planes





Part of 10,000 barrels of asphalt flown in to complete runway at Tegel, in the French sector. Bulky construction equipment was cut in two by blowtorches, shipped in on C-82s, and welded back together on arrival

treble the C-47's full load. Flight procedures and schedules have been reduced to as near precision standards as conditions permit.

Inbound traffic moves 170 miles an hour at assigned levels of 5000 or 6000 feet. Outbound craft fly 180 miles an hour at 6500 and 7500-foot altitudes. Airspeed indicators are constantly being calibrated to keep them all within a mile an hour of each other. Greater differences could mean fatal air collisions in bad weather.

In addition to careful initial coaching at the scene, pilots slated for the lift are now put through a three-week refresher course at Great Falls, Mont., Air Force Base, where most of the special Berlin procedures are rehearsed.

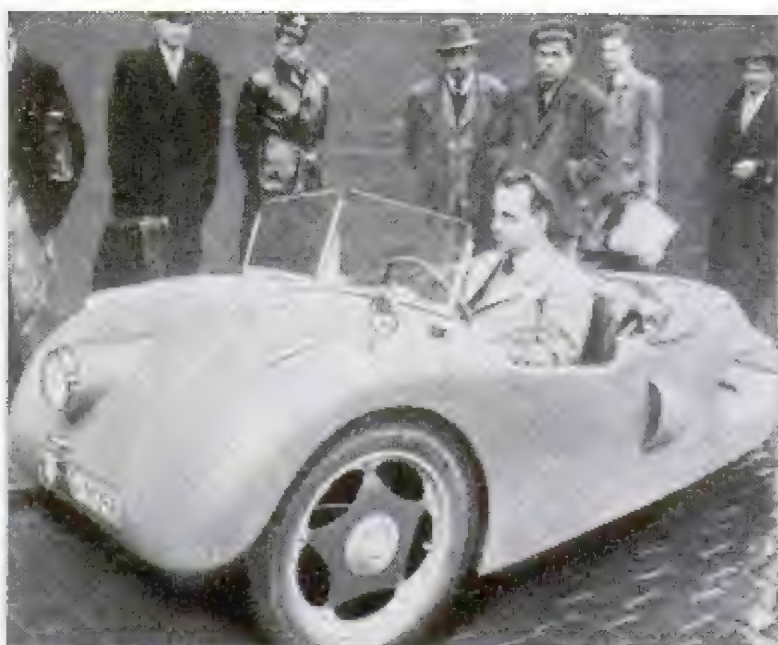
With ceiling and visibility unlimited, planes can be set down every three minutes at Tempelhof and Gatow. The same pace will eventually be duplicated at the third and newest field, Tegel, in the French sector. Even in the worst weather, the latest GCA radar units and experienced operators are expected to bring aircraft in at an average of one every six minutes. Airlines, under less pressure, take nearly three

(Continued to page 286)

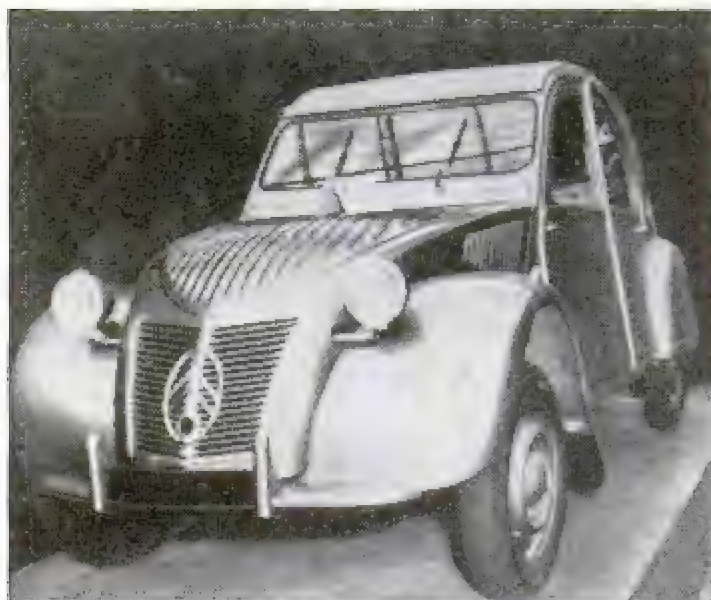


In contrast to busy Americans, above, keeping track of all U. S. aircraft in area, Soviet representative at Berlin Air Safety Center, below, has lone entry on flight control board, plenty of time to read





Three-wheeled Czech roadster has engine (left) just forward of rear wheel; note single headlight at right. The four-door French Citroen (left) is known as the "Ford" of France; right, another French car, the sporty Dynavia has excellent visibility. In background is the first jet aircraft built in France, the SO-6000.



Three New Lightweight Automobiles for Europeans

More evidence that Europeans will continue to drive small, economical cars is evidenced by three new models. Czechs in Prague are holding a contest to find an inexpensive car that is cheap to operate. At a recent automobile show in Paris, two new four-passenger French models that attracted attention are the Dynavia, a streamlined sports car affording excellent visibility, and the 1949 Citroen. The two-

door Dynavia has three shifts and overdrive, the engine is air-cooled and the car is said to have a top speed of 90 m.p.h. "with some effort." At normal speeds it travels 42 miles on a gallon of gasoline. The four-door Citroen has front-wheel drive. One lightweight Czech car has a two-cylinder engine in the rear and attains a speed of 50 m.p.h. It is said to run 63 miles on one gallon of gasoline.

Double-Duty Furnace Can Be Used With Either Coal or Oil

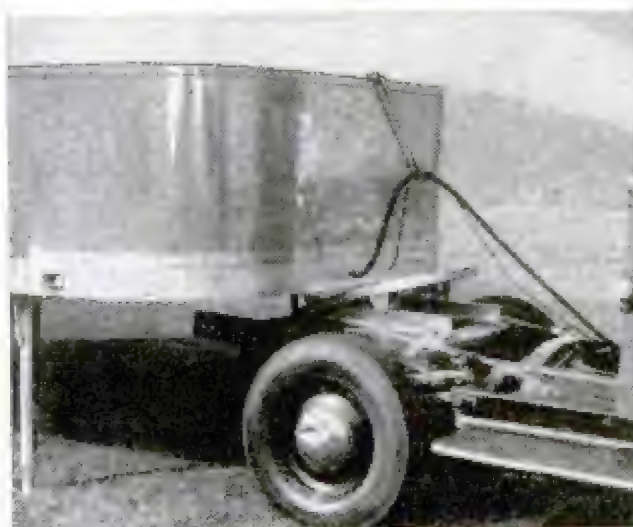
You have only half as much chance of suffering from a fuel shortage when your home is heated by a combination furnace that burns either coal or oil. To convert from one fuel to the other you merely throw a switch on the side of the boiler.

Two separate combustion chambers are built into the furnace and automatic controls prevent both from being used simultaneously. Another advantage of the unit is that the coal chamber serves as an incinerator while the oil burner is operating.



Conversion Kit Adapts Pickup Truck For Use as Semitrailer Tractor

Pickup trucks and jeeps can be converted into tractors for hauling semitrailers when larger trucking capacity is needed. The conversion kit consists of an aluminum semitrailer, available in 6000 to 10,000-pound capacities, and an easily installed fifth-wheel coupler that is attached to the truck or jeep chassis with four bolts. The changeover can be completed by one man in a short time. The trailer has heavy-duty hydraulic brakes actuated by a vacuum booster. Brake and electrical lines and controls are provided with the unit. Interchangeable sides and nose adapt the trailer for various loads. An enclosed-van model is being produced.



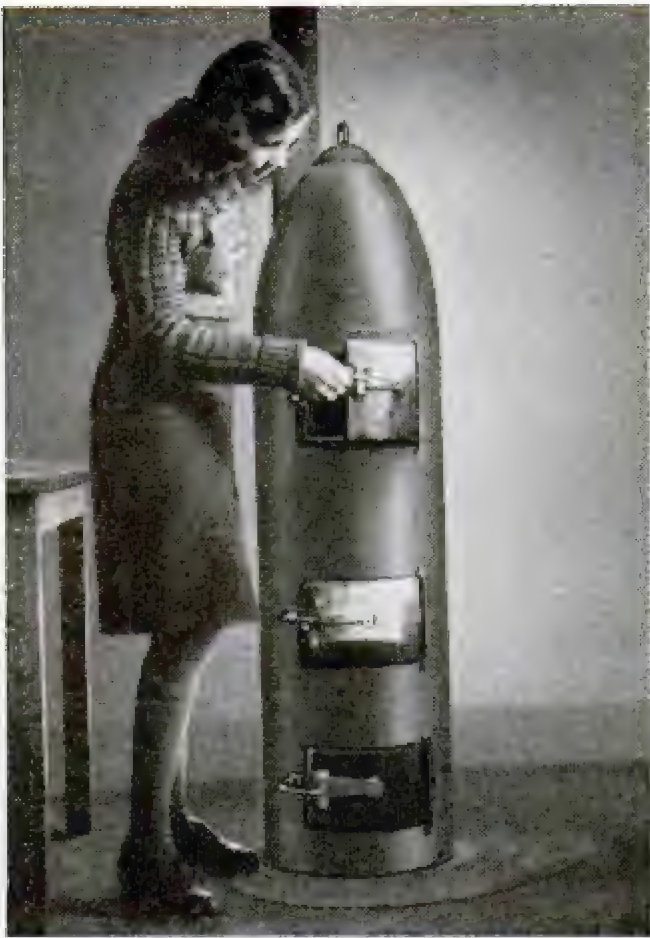
Top left, pickup body is removed from the chassis and (right) the fifth-wheel coupler bolted in place. Above, backing the tractor under the trailer body

Synthetic Rubber in Asphalt Makes Road Surface Wear Longer

There's a street in Akron, Ohio, that is paved with a synthetic-rubber mixture—not to make it softer to ride on, but to make it last longer under heavy usage. Finely powdered rubber is mixed with conventional asphalt black top at a tem-

perature of around 300 degrees. More nearly waterproof than regular black top, the new mixture is expected to be longer wearing and more resistant to cracking in cold weather. The mixture has been used successfully in England and Holland.





Stove From Unexploded Bomb

Even unexploded bombs are being used in Germany for commercial products because of the shortage of materials. A Hamburg firm is removing the explosive from 1000-pound dud bombs and rebuilding the shells into stoves. Hinged doors permit fuel to be added and ashes to be taken out.



Typewriter-Size Hand Loom Weaves Samples of New Designs

Sample swatches of new cloth patterns are woven in two hours on a small hand loom not much larger than a typewriter. If woven at a full-size mill, the sample would require several weeks' production time. The miniature loom is of the four-harness variety with a capacity of 240 ends of warp yarn. More than 200 new patterns of rayon for shirts and blouses have been woven on the loom. The sample swatches are $3\frac{1}{2}$ inches wide and 14 inches long.

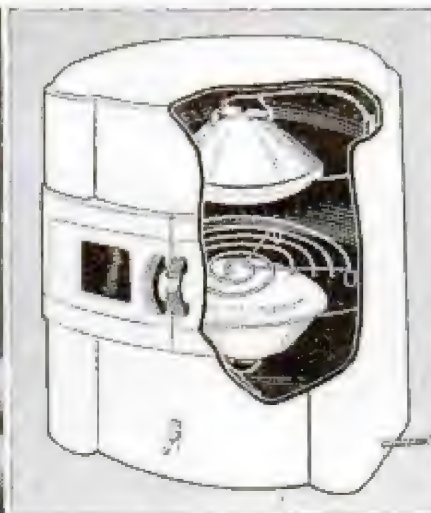
"Heatless" Oven Cooks Foods Quickly With Infrared Rays

Cooking can be done with the food wrapped in Cellophane to save dishwashing in a new infrared cooker that cuts cooking time 30 to 60 percent. The wrapped food is placed in a clear, heat-resistant glass dish and inserted in the cook-

er. Two infrared lamps, one above the wire shelf and the other below it, direct their heat rays into the food without heating the surrounding air and container. The cooker broils, fries or bakes and does all these without cooking odors. Roasts are

cooked in less than 15 minutes, hamburgers in four minutes. You don't have to turn the food over because it is cooked on both sides. Frozen foods can be cooked without previous thawing.

Flags recently developed by the Army's Quartermaster Corps are made of 75 percent nylon and 25 percent wool, a combination which gives a service life three times as long as all-wool flags.





Above, one of many attachments for handy power unit cuts weeds and thick brush. Other attachments at left from top to bottom are rotary hoe (hopper holds weights), buzz saw, power lawn mower

Master Tool Performs Score of Jobs

More than a score of attachments are available for a power unit which performs many jobs. It can be used to cut weeds and brush, as a power lawn mower, saw, garden cultivator, power sprayer, paint gun or snow sweeper. The power is supplied by either a two or four-horsepower engine mounted on a sturdy steel-tube frame with 20-inch wheels. When used as a weed cutter or in similar capacities, the machine travels on its own power. The saw attachment can be used horizontally for cutting small trees or in vertical position. Spray pump and tank convert the unit into a power sprayer which sprays trees up to 25 feet high.

Pull-Out Kitchenette With Refrigerator Fits in Small Cabinet

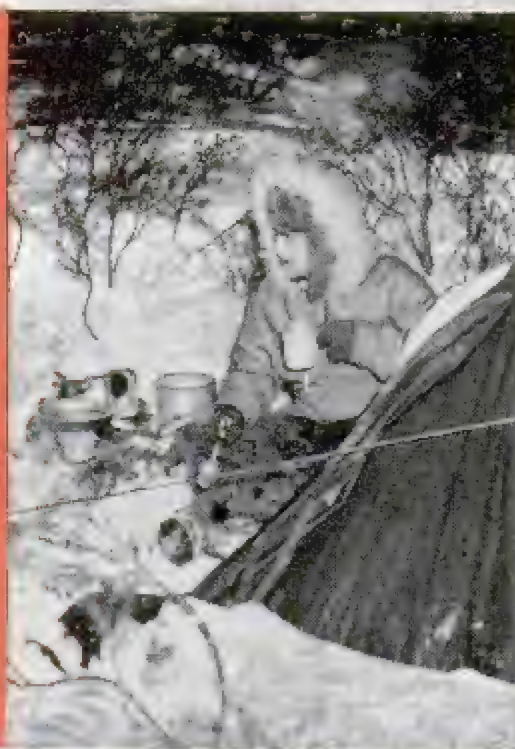
Most of the requirements of a kitchen are neatly fitted into a cabinet that resembles a piece of living-room furniture. The cabinet is 45 inches high, 37 inches wide and 20 inches deep. Inside are a pull-out sandwich board, a 2.2-cubic-foot refrigerator with two ice-cube trays, a cutlery drawer, and storage sections for dishes, glassware and foodstuffs. Designed as a snack bar for the home, office or boat, the cabinet has convenient electrical outlets for appliances.

¶ Production of penicillin now is 125,000 times larger than it was in the first six months of 1943, and the price of 100,000 units has dropped from twenty dollars to less than one dollar.





Sub-Zero Housing Project



Air Force photo

At the Air Force's Arctic survival school, short saws prove best tool for cutting out blocks for snowhouses

For brief stops on frozen tundra, men learn to make shelters from scrub willow and scraps of chute cloth

As part of their training, students make trek across country wearing snowshoes, carrying a 50-pound pack





Entrance to snow cave, above, is made as small as possible to prevent heat loss. The central room is high enough to permit occupants to sit erect at meals. Branching out on either side are smaller rooms for sleeping, each one just a trifle longer than the student's sleeping bag

From top to bottom at right, U. S. infantrymen in north-country maneuvers find packed snow in open drifts best for building igloos. With base circle complete, they chink loose snow on seams and shave surface rim at angle to start second row of blocks slanting inward. Best way is to start with big blocks and use smaller ones as wall rises. Structure is completed when worker pulls final block into remaining gap at peak and slices it into position. Finished in less than three hours, this weather-tight house will hold five and stand up to 500 pounds weight at top



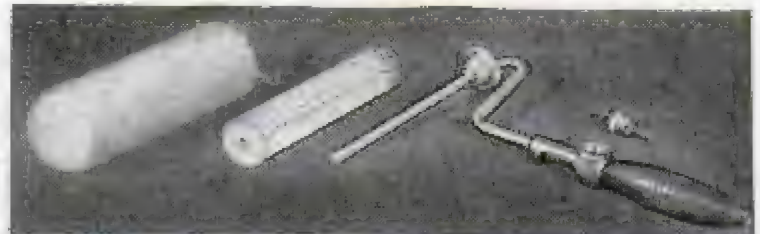
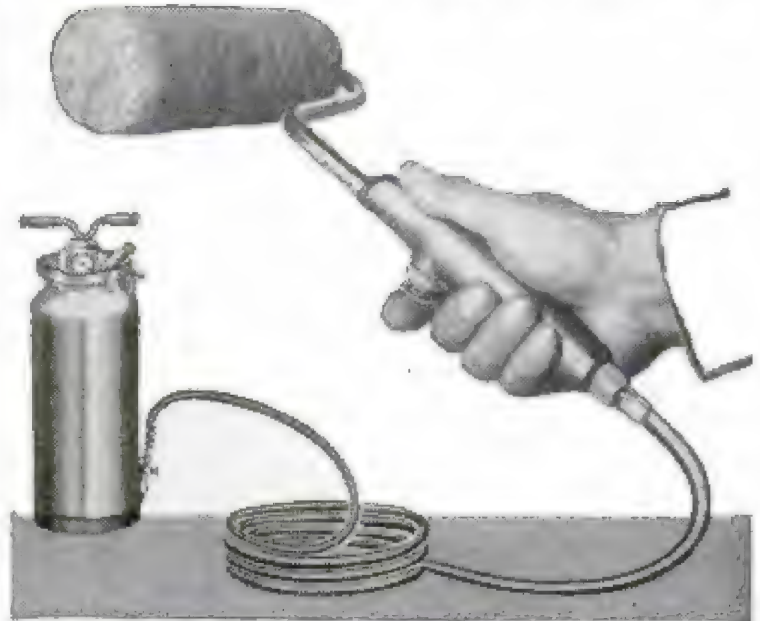
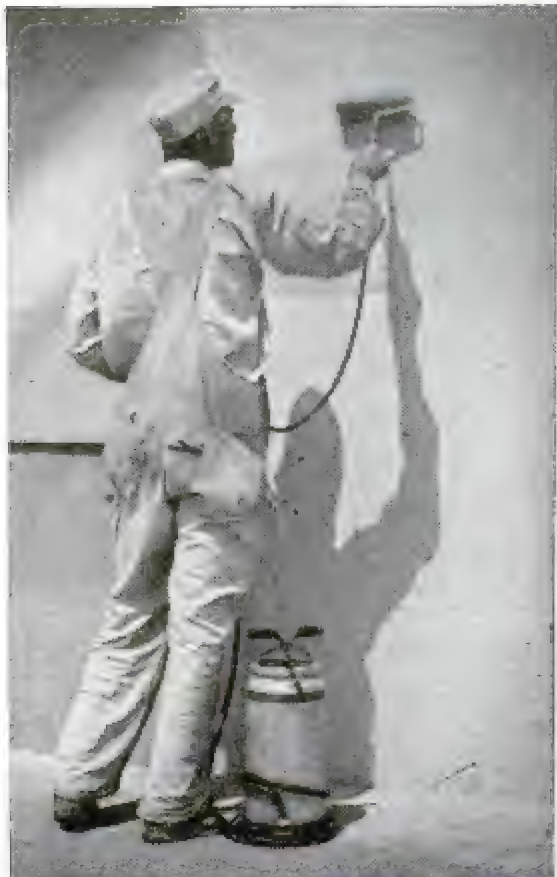
U. S. ARMY photos



Full-length shelter, below, was built with too high an opening, permitting loss of precious heat. Pieces of wire and string are used to bind together branches forming skeleton for shelter. It can be erected in a few minutes



You Don't Have to Dip This Paint Roller—It's Fed By Air Pressure



Left, painter doesn't have to stop to dip the roller. Top right, close-up shows the air-and-paint tank. Control valve is on handle of roller which consists of perforated plastic cylinder and sheepskin cover, below

Paint goes on any surface evenly without waste with a self-feeding roller that eliminates the brush and speeds paint application. Paint is forced by air pressure into a perforated plastic cylinder covered

with wool fleece. A hand pump built into the tank provides the pressure. Smaller rollers are provided for painting wood trim and for getting into corners. The roller can be used with almost any type of paint.

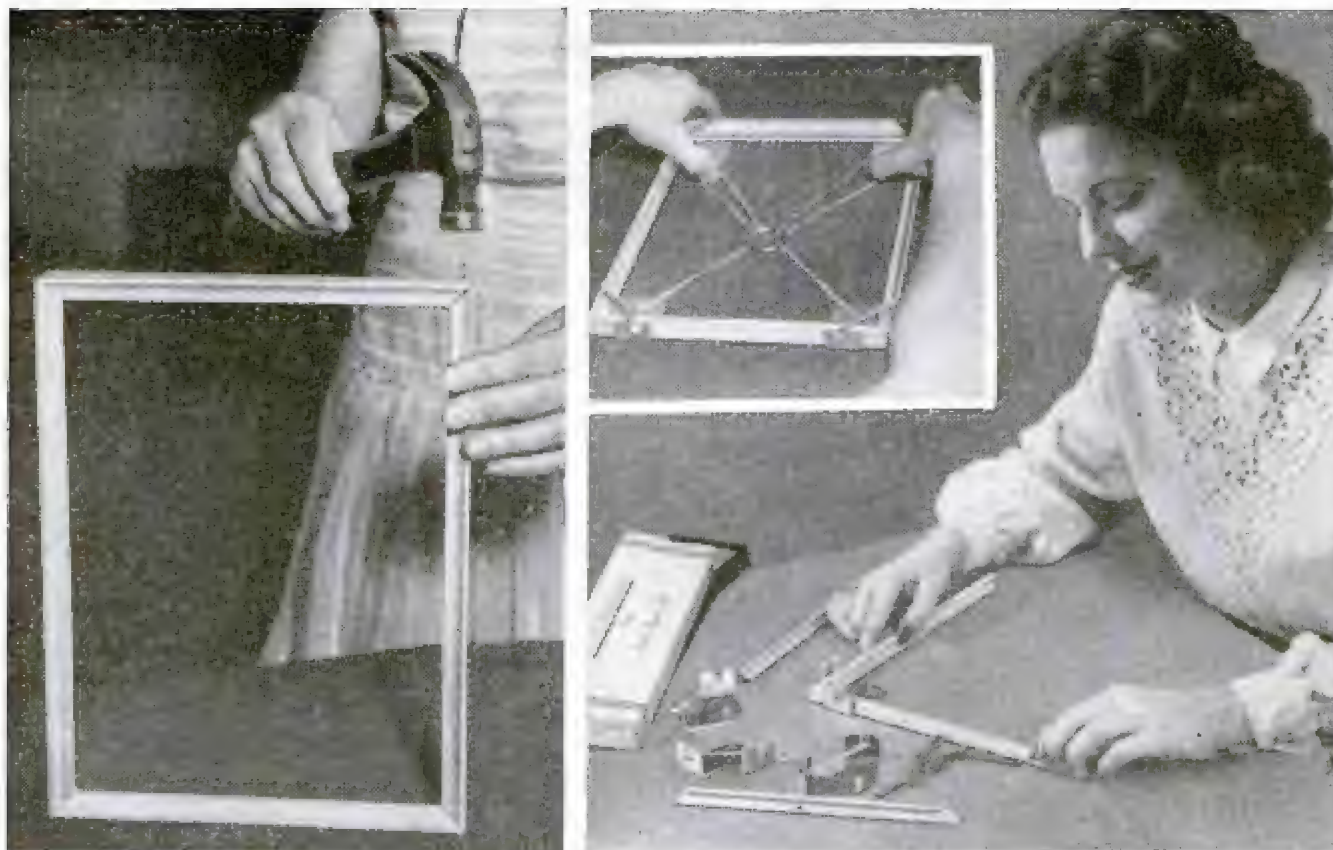
Sun's Rays Converted to Electrical Energy That Runs a Midget Motor



Sunshine can be used as a source of electric power, according to J. Thomas Rhamstine of Harlingen, Tex., who is building "solar motors" to prove his theory. When the sunrays strike a special metal disk they are converted into electrical energy, according to Rhamstine. In the models, the output is measured in microwatts and is used to turn a tiny motor.

Crepe Tape Made of Wood Is More Durable Than Paper

Colored decorative tape made of wood cut in very thin slices is being produced in Japan as a substitute for crepe-paper tape. It is described as more durable and less expensive than the paper variety sold in that country. Less inflammable than crepe paper, the wooden tape is also moisture resistant.



Picture-Framing Kit Includes Precision-Cut Molding

Amateur decorators can frame their own pictures of various sizes with a kit which holds all the necessary parts except the glass. Parts include the molding, aluminum corner supports to hold the frame pieces in position while "setting" and a ring with

rubber bands for drawing the frame together. The molding is precision mitered and the ends are coated with adhesive. Top and bottom pieces are drilled to accommodate small brads. The frames are available in sizes up to 16 by 20 inches.

Gasket Repair Kit

Materials for repairing worn gaskets of almost any type are included in a kit designed for home use. Homeowners can repair leaking faucets, valves, pipes, motors and pumps by cutting gaskets from the material. The kit contains a sheet of asbestos to repair steam, heat, acid and ammonia leaks; a sheet of fiber for oil, gas, air and gasoline leaks; a sheet of rubber for water leaks and a 24-foot length of fiber cord for stopping faucet leaks. Gaskets of any shape can be cut from the material with a pair of scissors.

☛ The amount of sugar in apples goes up with the amount of sunshine they have during the growing season.



Debut for the '49 Chevrolet



This Styleline De Luxe four-door sedan is roomier and wider and has a visibility increase of 30 percent

CHEVROLET—one of America's Big Three in popularity—is getting off to a flying start in 1949 with a complete line of new models that have a distinct "General Motors Look." The Chevrolet Division's first real postwar car is conservative in design compared with some of its competitors, but is a new automobile from the wheels up—with the exception of the engine which is basically the same as the '48.

Two of the major changes are a redistribution of weight which dictated the design of the new body and a new steering system. The combination of these two factors with direct-action shock absorbers and low-pressure tires on wide five-inch rims gives the driver a feeling of handling a much bigger car. Passenger comfort also hits a new high for Chevrolet in the roomy '49 models. The car is wider and lower and visibility has been increased 30 percent.

In the weight shift, the engine was moved four inches forward with corresponding changes in the passenger compartment. Rear-seat passengers no longer ride over the rear axle, but are cradled more comfortably between the front and rear axles. A lower center of gravity helps the car hold the road on curves and at high speeds. Also, the low floor, together with wider doors, makes it easier to get in and out.

The new center-point steering system is

so called because the master arm is located in the center of the chassis front end, equalizing the effort of right and left turns. This "big car" type of steering control is designed to check any tendency of the automobile to wander and is said to be easier on tires.

The 90-horsepower engine is a 216.5-cubic-inch valve-in-head six. Among engine improvements is a fuel-lubricated accelerator pump in the carburetor. The pump is submerged in gasoline, making it impossible for air to reach or pass by the pump seal. This assures consistent power delivery under all conditions, according to Chevrolet engineers.

The '49's gearshift is new—something which comes as a surprise to many Chevrolet drivers. A switch has been made from the former vacuum-assisted mechanism to the manual shift. This change was decreed after some recent improvements in shift linkage. The new shift has a light positive action and lends itself to fast shifting and easier maintenance.

Another innovation for the '49 is in the starter switch, which has been lifted from the floor to the instrument panel. This is a solenoid-type switch. The starting mechanism incorporates the time-tested overrunning clutch, which allows the flywheel to turn faster than the starting motor while



The 1949 Chevrolet station wagons are available in either wood or all-steel bodies. Above, wood-body type

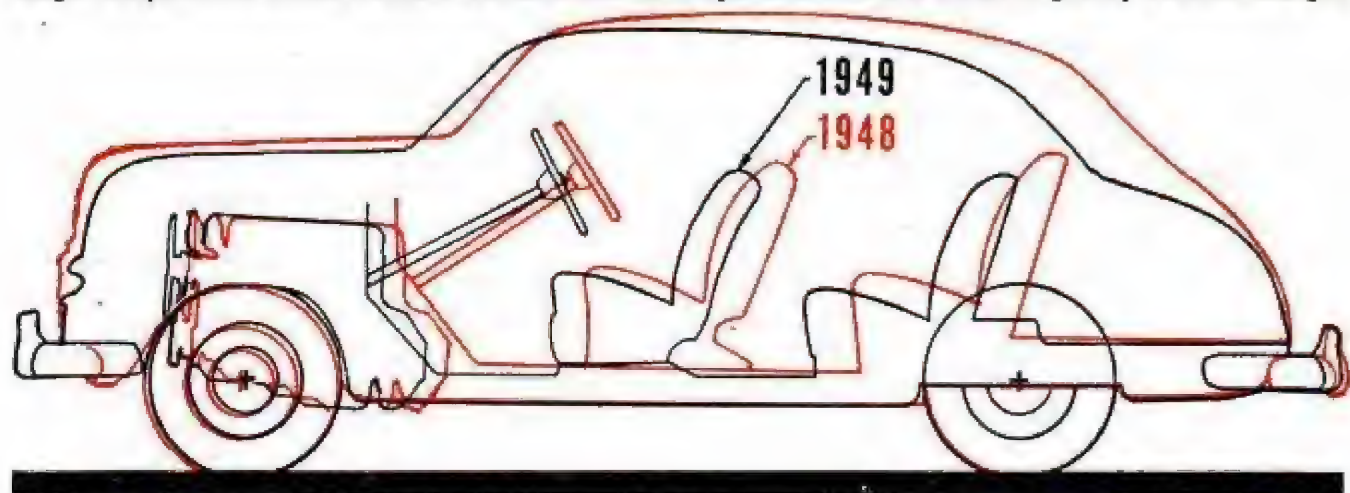
the driving pinion remains engaged with the flywheel. This type of starter saves the driver the bother of having to release the starter button if the engine sputters and dies during the starting. The starter may be operated regardless of the position of the ignition switch.

Other new features for the driver include instrument dials grouped in a circular cluster on the face of a "jumbo" speedometer, push-pull window wings which eliminate the former "ventipane" handles, a thinner and lower steering wheel, and an entirely new ventilation system. The cowl

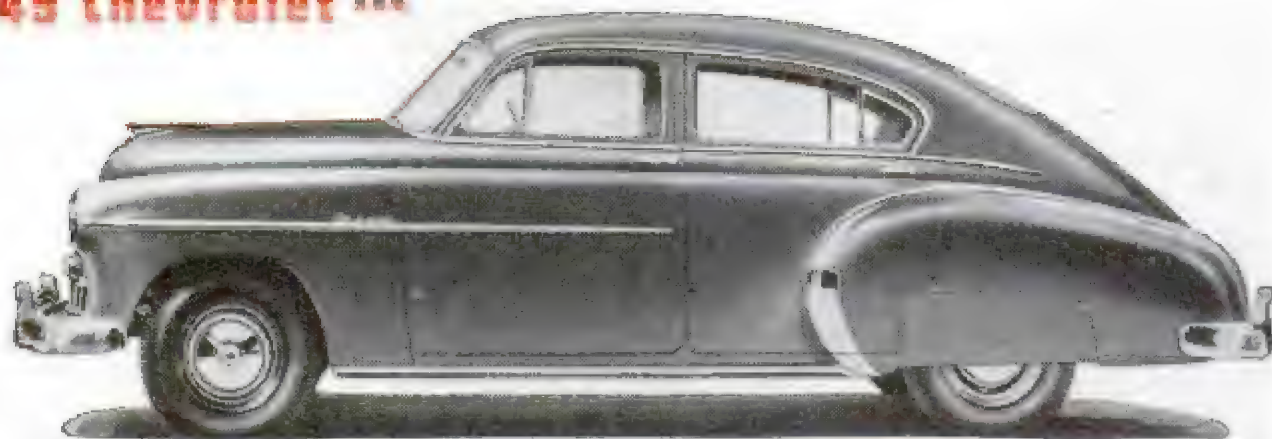
vent is omitted in the new Chevrolet and fresh air is drawn into the passenger compartment through ducts located between the front fenders and the radiator. These ducts lead to tubes ending behind the instrument panel. Air is metered by butterfly valves controlled by manually operated knobs on the instrument panel.

The new suspension system has helped reduce the car's weight. The old parallel-type shock absorbers, both at the front and rear, have been replaced with the airplane type. Those at the front are located inside the coil springs and are removable for

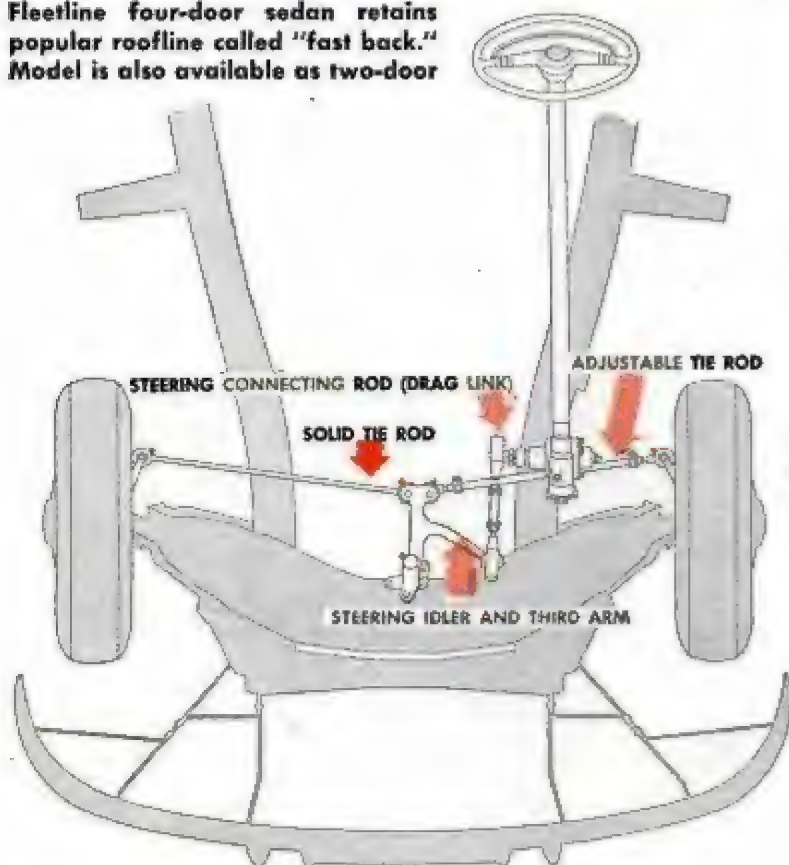
Here's Chevrolet's answer to: "Is it a new car?" Note how the car has been lowered and the engine and passenger compartment moved forward. Redistribution of weight with new low center of gravity dictated changes



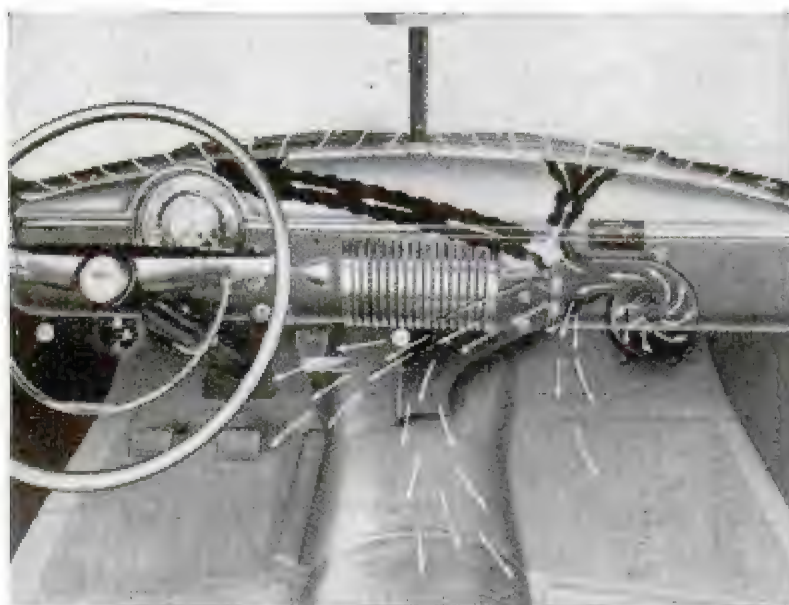
'49 Chevrolet ---



Fleetline four-door sedan retains popular roofline called "fast back." Model is also available as two-door



New center-point steering system reduces tendency of a car to wander. Below, arrows show new ventilation and heater system. Also, note new steering wheel and instrument dial cluster



maintenance through a hole in the lower control arm of the knee-action unit. The entire suspension assembly, including the front cross member, is 12 percent lighter and has greater strength than that of previous models.

Other minor improvements on the new models include larger trunks equipped with automatic locks, rear-compartment dome light doubled in candlepower, a concealed gasoline filler pipe on the left side of the car, parking lamps built into the grille, a chromium body speedline for the protection of doors and a ball-bearing-mounted adjustment for the front seat.

The '49s are being built in both the Fleetline and Styleline series. Fleetline models consist of two and four-door sedans. The Styleline offers, in addition to the sedans, two coupes, a convertible and two station wagons.

CHEVROLET SPECIFICATIONS

Engine—Valve-in-head, 90 horsepower, 6 cylinders

Compression ratio—6.6:1

Fuel system—Single-adjustment balanced downdraft carburetor with accelerating pump

Wheelbase—115 inches

Over-all length (including bumpers)—197 inches

Station-wagon length—198 inches

Height—63 $\frac{5}{8}$ inches

Width (widest part)—73-15/16 inches

Ground clearance, rear axle—7-13/16 inches

Weight (4-door sedan)—3225 pounds

Gearshift—Mechanical

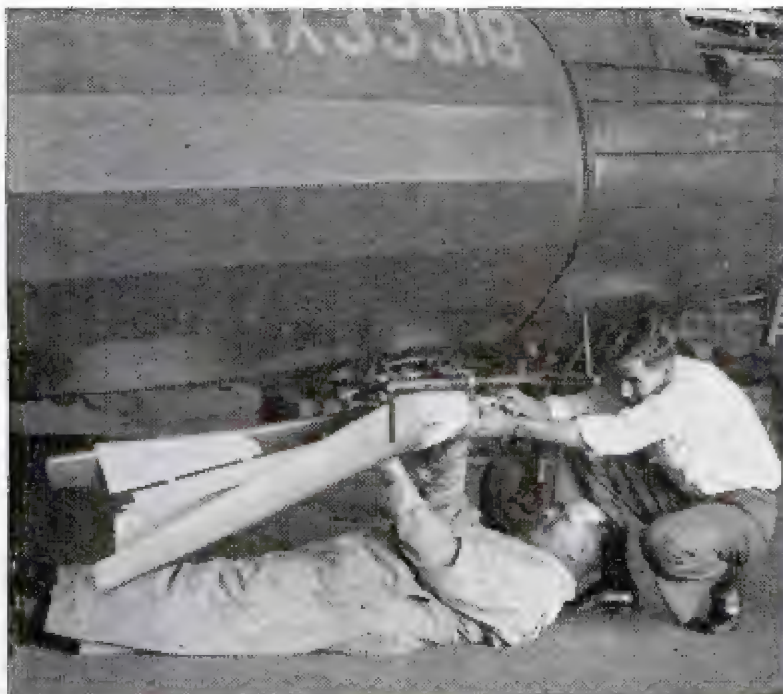
Front suspension—Unitized knee action with double-action hydraulic shock absorbers, ride stabilizer

Rear springs—Semielliptic springs and shackles of tension type, direct double-action hydraulic shock absorbers

Drive—Torque tube

Brakes—4-wheel hydraulic

Tires—6.70-15 on 5-inch rims



Supersonic "Chute" Has Propeller To Slow Down Rate of Descent

Resembling a giant dart with a whirling propeller near the tip, a rotochute gently lowers research instruments from rockets shot into the upper atmosphere. The rotochute may be used in the future to help supersonic pilots escape from disabled planes at high altitudes, where ordinary parachutes would be useless, according to General Electric engineers who developed the device. When it is released from a rocket or plane, the vanes begin to whirl and fold out at right angles to the bullet-shaped container. They act as brakes, slowing the rotochute from supersonic speeds to about 27 miles an hour when the container strikes the ground. Of those developed and tested, the most successful model is about four feet long, eight inches in diameter and has vanes which extend out about eight feet. It can carry a 20 to 30-pound load of instruments.



Top left, attaching the rotochute to helicopter for tests. Right, the "chute" falls at 27 miles an hour as it nears ground. Above, one of 23 models tested



Self-Contained Paint Sprayer Has Built-In Motor and Compressor

Complete with a built-in electric motor and compressor, a one-unit paint sprayer eliminates the need for cumbersome air hoses and extra equipment. You just fill the unbreakable paint container, plug in the power cord and the sprayer is ready for use. It is made of aluminum and weighs only four pounds. Operating at 50 pounds' pressure, the sprayer provides thorough atomization of paint.

¶In two years the number of self-propelled combines on American farms increased 183 percent, from 3539 in 1945 to about 10,000 in 1947.

The Power Line Comes to Yellowknife



IN THE lonesome vastness of Canada's sub-Arctic region, a streamlined hydroelectric plant, less than 300 miles from the Arctic Sea, marks the advance of industrial progress in the northland. Straddling Snare River near its mouth on Great Slave Lake, the dam and power station provide continuous electric power for the fabulous and fast-growing community of Yellowknife, where gold mining and its related trades have attracted 4000 persons.

This newest northland installation augments by almost 200 percent an older

By Harry Chapin Plummer

generating station of 4700-horsepower capacity which

for several years has been in operation at Blue Fish Lake, about 25 miles north of Yellowknife. The Snare River development, with its peak output of 9500 horsepower, will, in aiding the growth of the area's mining industry, help to bring about a need for even greater power facilities as industry spreads over the stretches of stunted woodland that separate the dam from its "market," Yellowknife.

That mining center is undergoing a metamorphosis from a primitive, "hell roar-

Tractor-train pulls into Yellowknife after snaking its way across the frozen surface of Great Slave Lake. The trip took more than a week





Marking the frontier of industrialization in Canada's northland is this dam and power station at Snare River

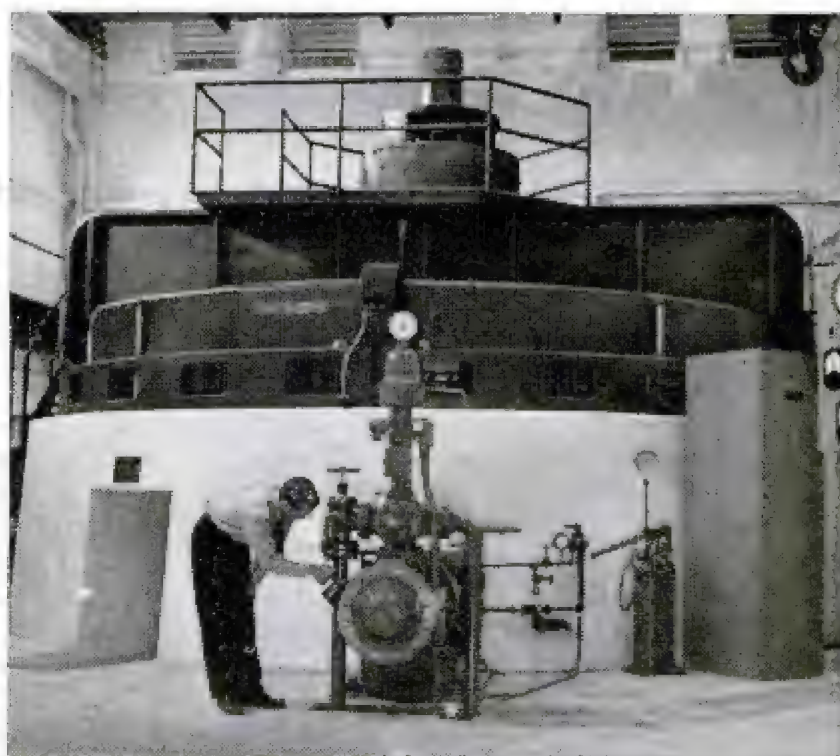
ing" pioneer settlement to a modern, planned town. Old frame dwellings and business structures that stood or leaned drunkenly askew for years are fast giving way to up-to-date construction.

Primarily, the Snare River development will serve the basic industry at Yellowknife, gold mining. At the same time it will serve other industries that have grown up around the community. Among these is a fish-canning and storage plant at Blue Fish Lake which annually ships upward of one million pounds of lake fish to Canadian and U. S. markets.

The staff at the power project has to be content with infrequent trips to the "big" city of Yellowknife. Such trips involve a plane ride equivalent to a flight from New York to Philadelphia. For a shopping junket, a trip for emergency supplies or a session at the movies, airplanes are the only means of transit. There is nothing that resembles a highway and no automobiles. If there's no hurry, the trip can be made in summer by canoes with portages or in winter by dog sled.

The equipment at the power project is the best available. Here a technician services the big generator and turbine

Construction of the Snare River power development by the Canadian Department of Mines and Resources was a difficult job made infinitely more difficult by the weather. The permanently frozen soil, permafrost, its surface turned into a sticky, slippery mud by the Arctic sun's intensive rays, was but one of the problems. Transport of incoming construction and installation equipment presented the supreme obstacle that had to be hurdled months and years



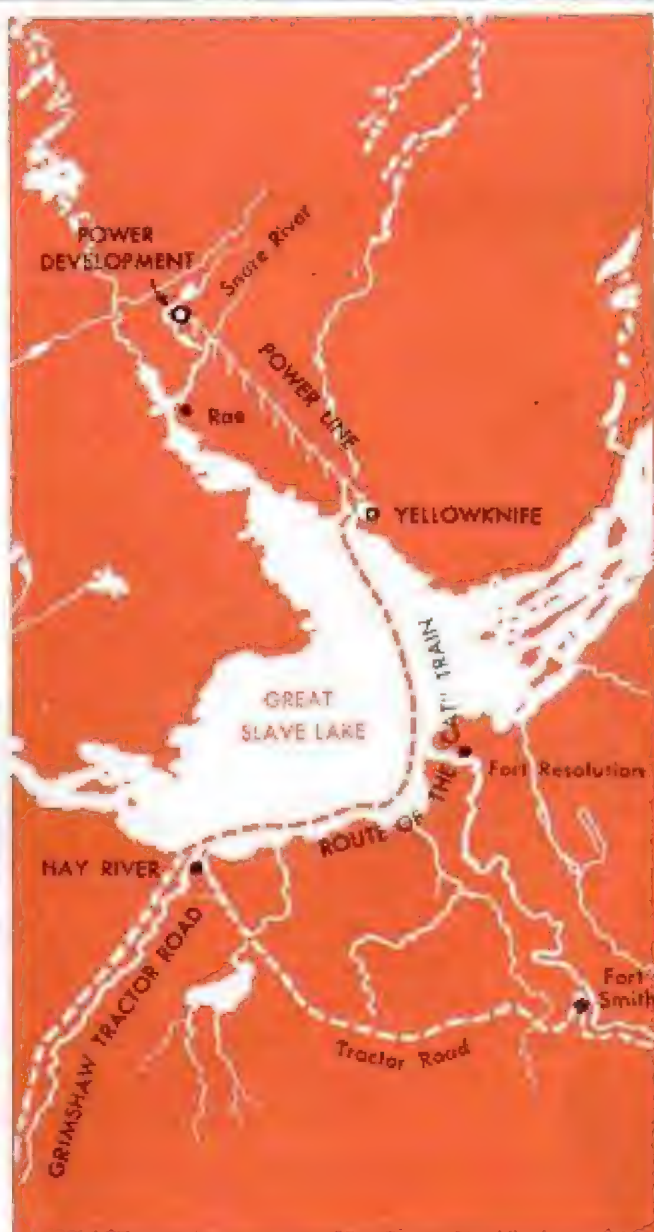


Another photo of the tractor-train at Yellowknife. Canoe in foreground has been stored for the winter

before the power could be turned on. There was the problem of gauging the correct tension on the three-wire transmission line in a land where the year's extremes of temperature range from 60 degrees below zero to 90 degrees above. Almost \$5,000,000 were spent on the new plant with no hope or expectation of an early return.

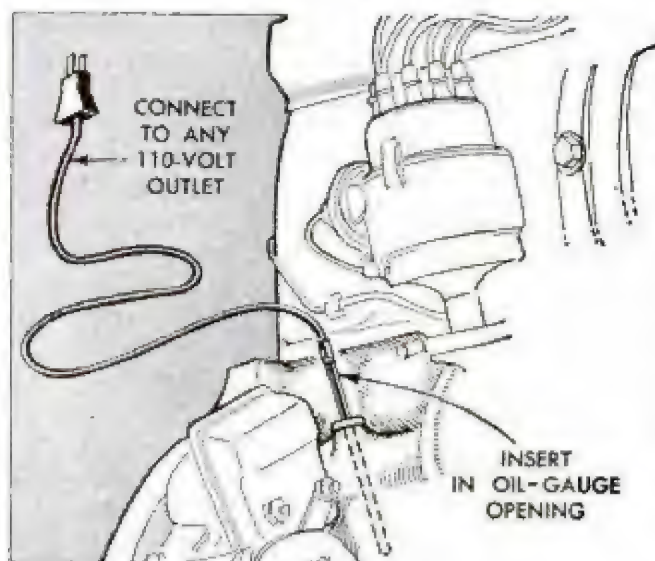
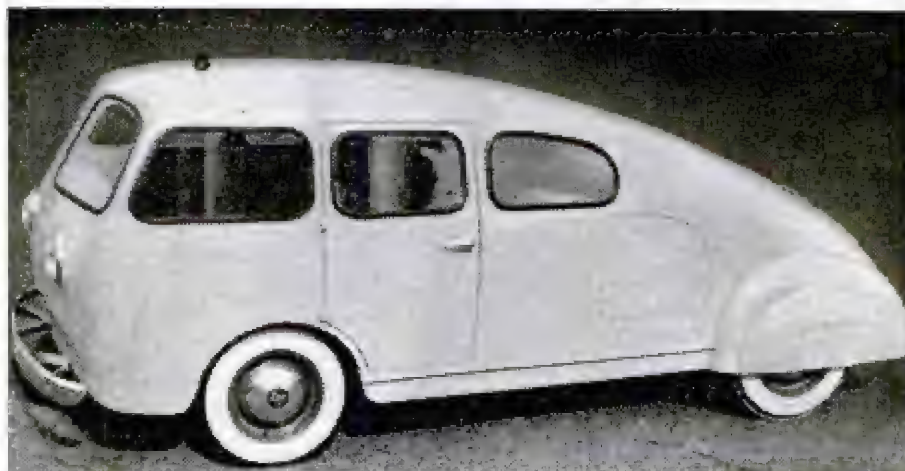
(Continued to page 284)

The home of the Snare River project's superintendent is complete with radio and other electrical servants



Rear-Engine Car Looks Like Bus

Assembled entirely from standard parts and sub-assemblies, a rear-engine automobile called the Mustang has been introduced in Seattle as the newest entry in the low-price field. The car, which seats six, two in front and four in back, is designed to sell for \$1235. It has a four-cylinder, 59-horsepower Hercules engine. The power unit, consisting of engine, transmission and rear axle, slides out for repair when the body is raised. A door in the body just ahead of the rear wheel provides access to the engine for servicing. There is a large luggage compartment in the rear. The buslike front end provides excellent visibility for front-seat occupants.



Electric Heater for Car Motor Fits in Dip-Stick Opening

Instant starting of a car in the coldest weather is assured with a motor heater that fits any auto and may be left in the motor any length of time. The heater is a rod that is inserted in the oil-gauge opening after removal of the dip stick. It plugs directly into a 110-volt a.c. or d.c. outlet, and is rated at 100 watts. Heat from the rod keeps the oil, motor block and all moving parts warm, reducing battery wear. The heater is available in two models, one with a 3-foot cord and the other with a 12-foot cord to eliminate the need for an extension.

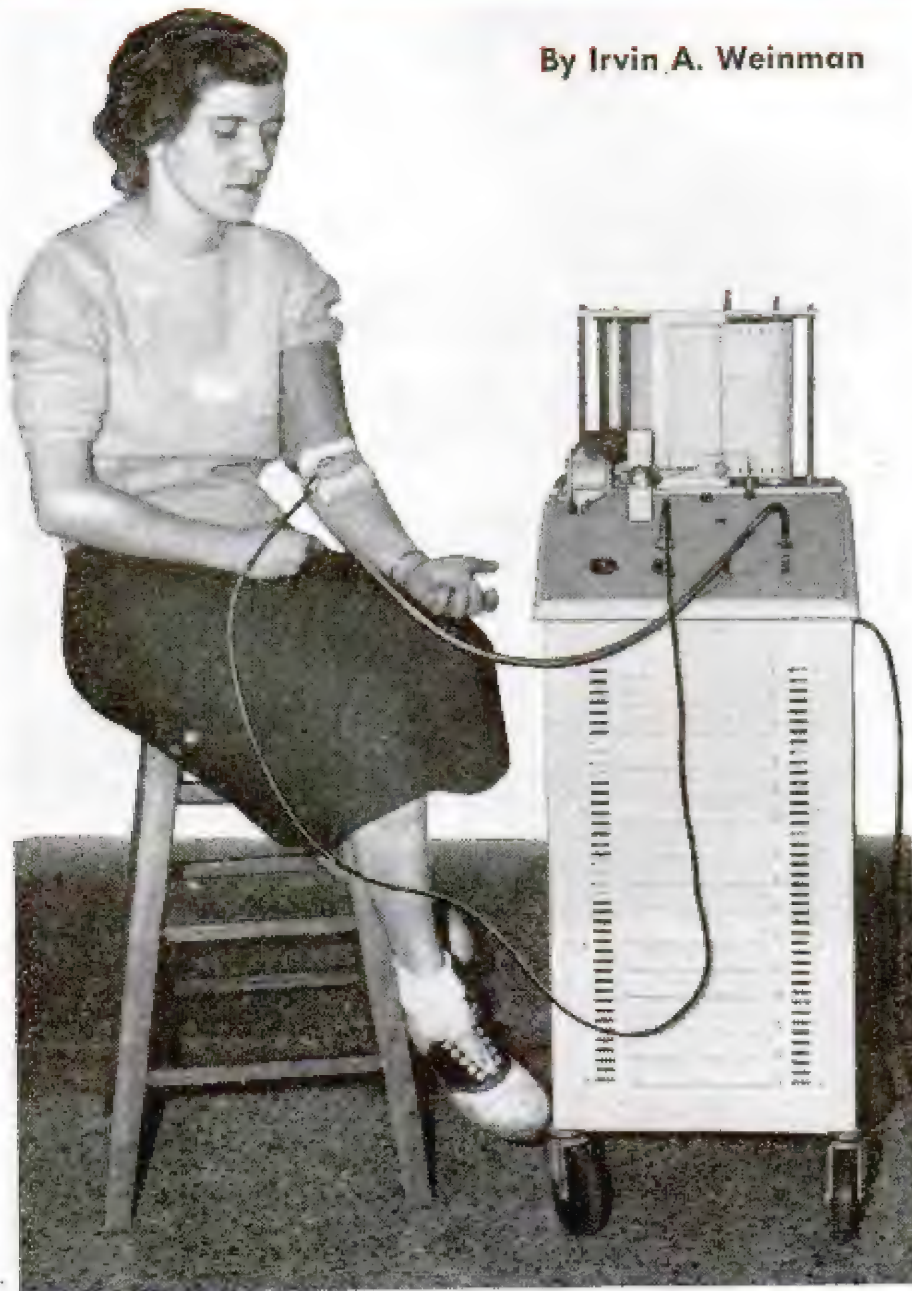
Waterproof Cover of Nylon Straps Over Motorcycle

Motorcycles are protected from rain and snow by a waterproof cover made of nylon. The cover fits snugly over the motorcycle and is fastened at the bottom with straps. When not in use, it can be folded into a two-pound package measuring only 2 by 6 by 10 inches. The cover is available in two colors, and in models that are cut to fit motorcycles with or without windshields.



Automatic Recorder Takes Continual Reading

By Irvin A. Weinman



Nervous patient can be left alone with machine. When patient relaxes, the blood pressure drops and the instrument records the normal pressure

A HUSKY 20-year-old boy recently walked into a Navy recruiting office to enlist. A few minutes later he emerged in a daze—he had failed to pass the physical exam because of high blood pressure.

After considerable worry about his condition, he visited his family physician for treatment. A thorough recheck failed to indicate that his pressure was at all above normal. Had the Navy doctor made an error? Probably not.

What may have occurred is a phenomenon called "the psychic pressor effect"—boosting of the blood pressure by nervous tension. Grateful that he was in good health, the young man applied again. This time he passed with flying colors.

Because of this psychic effect, determining the real blood pressure is a dilemma to the doctor. He knows pressures can spiral upward at the slightest provocation. People can cleverly conceal their emotions, sometimes even from themselves. Consequently, it is a difficult task for the doctor to tell by casual observation whether or not his patient is tense.

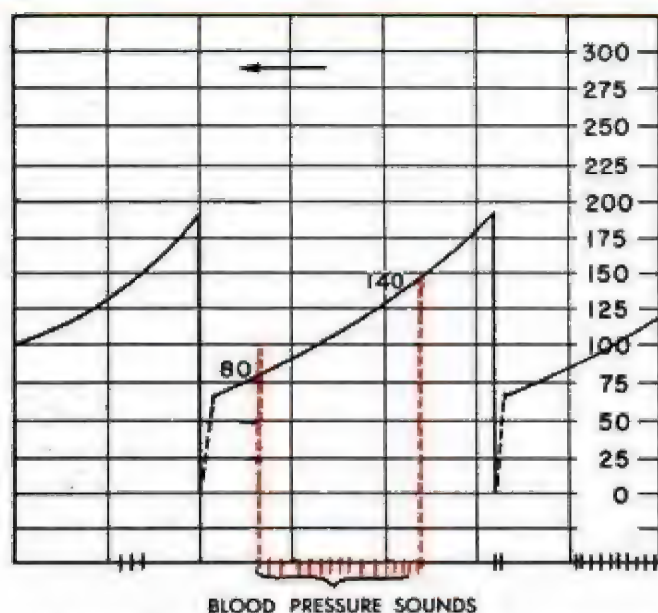
Dr. W. E. Gilson, head of electronics research at the University of Wisconsin medical school, has developed a machine designed to lick this psychic pressor effect. It is called the automatic blood-pressure recorder. After a few simple adjustments have been made, the examining physician can leave the room and the machine will record faithfully variations of blood pressure on a moving strip of paper. Reclining on a cot if necessary, the high-strung patient is given an opportunity to calm down. As a result, accurate readings of pressure are possible.

Doctor Gilson's automatic machine operates on the same principle as conventional hand-operated equipment. A rubber

cuff is automatically inflated and deflated by an electronic control which activates a built-in air compressor. Sounds of the blood flow in the arm are picked up by a tiny microphone called a stethophone, amplified thousands of times and recorded on the lower part of a moving chart by an electronically controlled pen. Another pen, controlled by the equivalent of the rising and falling mercury column, records the variations in blood pressure higher up on the chart. The actual pressures can be observed by matching the heart-sound lines with those made by the pressure indicator.

In his research Doctor Gilson also found that the recorder can be used in the operating room. The usual procedure during

of Patient's Blood Pressure

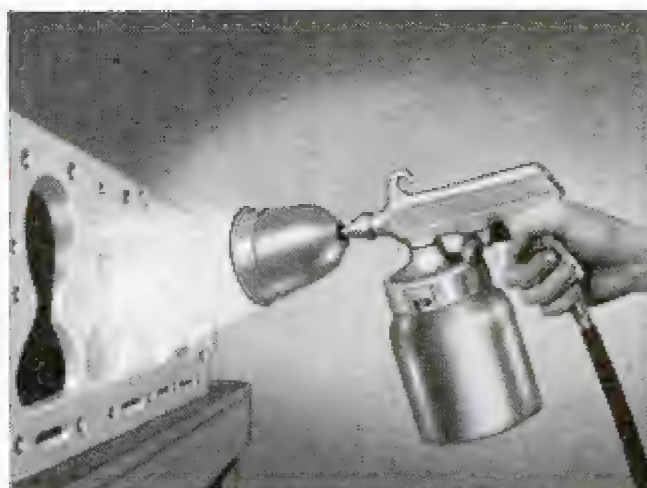
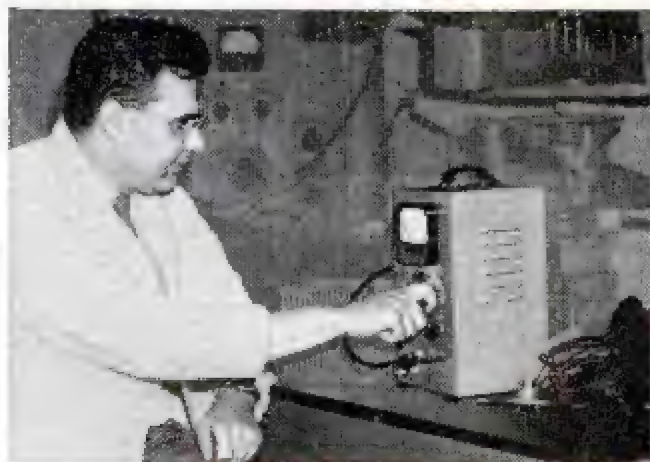


Patient's blood pressure, as recorded on this graph which rolls out of instrument, is about 140 over 80

surgery is for the anesthetist to take the patient's blood pressure periodically in addition to his regular duties. Sometimes, especially during long brain operations, it is difficult for him to do this. With the automatic recorder in use, movements of the recording pen, which is activated by the heart sounds, can be heard across the room. This allows the anesthetist to take blood pressures by ear, meanwhile attending to his other duties. An occasional glance at the pressure indicator will tell him whether blood pressure is rising or falling.

The automatic blood-pressure recorder, Doctor Gilson says, may also be used as a lie detector. Another pen, activated by respiration rate, can be attached to the machine. The three most important components of lie detection are pulse rate, blood pressure and respiration rate. The recorder can measure all three.

Doctor Gilson, recorder's inventor, also has used it as a lie detector by recording respiration rate, too



Gun Sprays Liquid or Abrasive

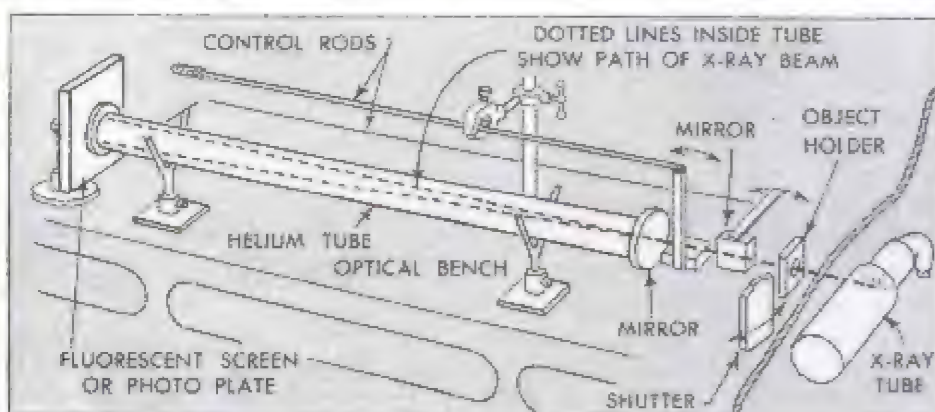
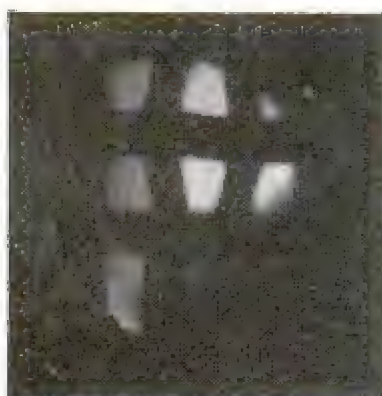
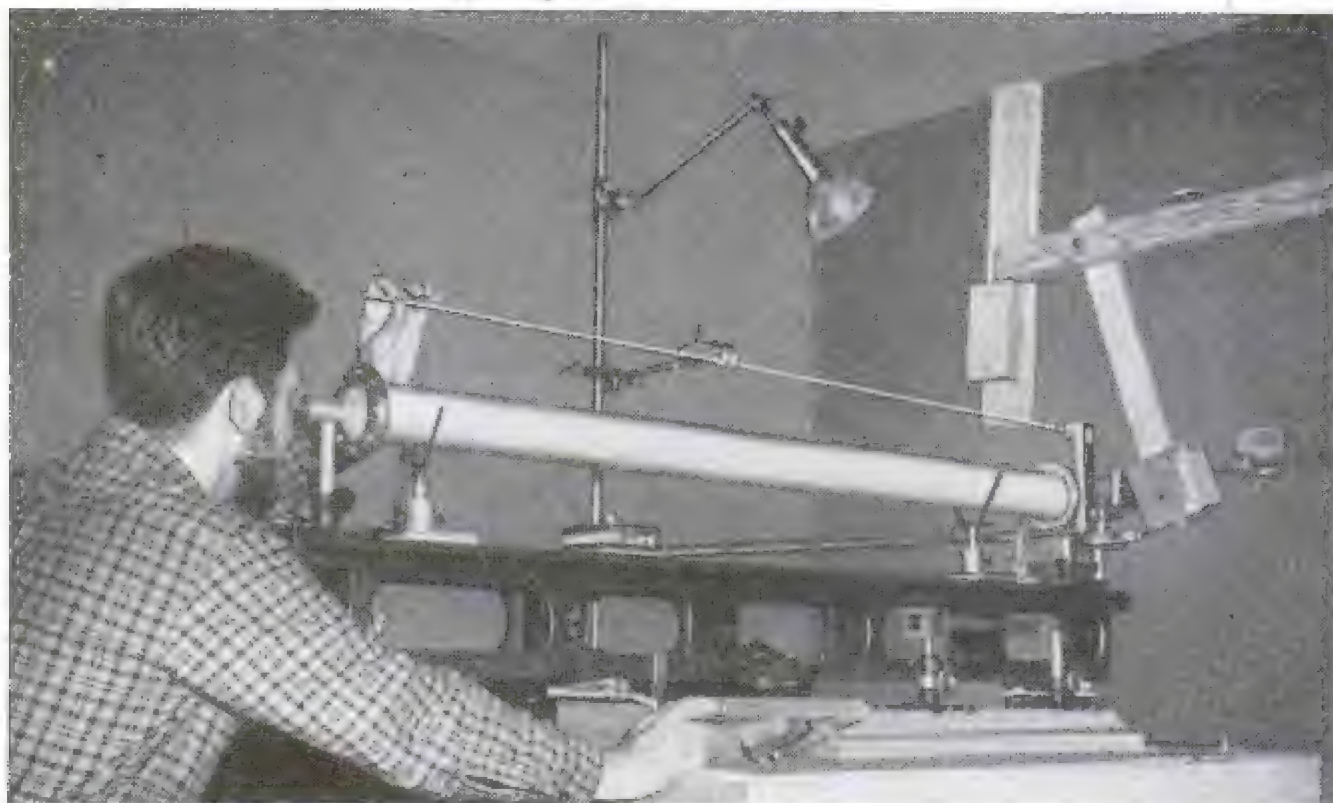
Sandblasting or liquid spraying reaches inaccessible places with a combination blast gun that can be connected to any air line. This blast gun, designed for automotive and industrial work, is handy when working on wheels, drip moldings, grillwork, steam radiators, fins and other parts. It is used to remove paint, rust and scale. Solvents are used to flush out grease, gum and tar. One retaining nut holds interchangeable nozzles—one for use in "blast" operations; the other for spraying oils or chemicals. A turbulence shield stops and retains most of the spent abrasive ricocheting from surfaces being worked. The solvents or abrasives are drawn up from a three-pint container that locks below the barrel with a quarter turn.



Rocks Ballast Fence

Because much of the terrain in the northern Rocky Mountains is so filled with stone that the digging of post holes is virtually impossible, ranchers have been forced to invent a new type of fence. They fasten two posts together and stand them on top of the ground in an inverted vee. Rocks are tied to lengths of heavy wire and suspended between each pair of crossed posts to give the fence stability.

X-Ray Microscope Opens New Fields in Living-Tissue Research



Top, long control rod is used to adjust microscope mirrors while examining X-ray image through eyepiece. Left, X-ray microscope photo of wire gauze with 250 meshes to inch; right, sketch shows how instrument works

An X-ray microscope developed at Stanford University eventually may allow examination of objects less than a millionth of an inch in size and will permit microscopic studies of living tissues.

Such a microscope long has been considered an impossibility because X-rays don't follow most optical laws. They may be reflected at very low angles from some surfaces, similar to the way a stone may be skipped across water, and this principle was utilized in the new microscope. Essentially, the device employs a beam of soft X-rays that after passing through an object is slanted off a small horizontal concave mirror with a metallic surface and is then slanted off a similar reflector placed in a vertical position. Each mirror balances out the distortion produced by the other and spreads the rays to produce magnification in the manner of a movie projector. The X-ray image is projected

through a long helium-filled tube to prevent absorption of the rays and the image may be examined by eye or photographed. Although research is not complete, successful X-ray photographs with a magnification of close to 100 times have been made of fine wires invisible to the naked eye in ordinary light, as well as magnified pictures of fine gauze screens. The investigation is being carried on by Dr. Paul H. Kirkpatrick and by Dr. Albert V. Baez. The new principle opens the way to examining interiors of living biological specimens, the interiors of metals and the simplification of X-ray spectroscopy. Another possibility is a high-intensity type of X-ray gun that would condense a broad beam of X-rays down to a pin point. The research, at some time in the future, may lead to the use of other particles, such as beams of neutrons that would be employed in neutron spectroscopy.

They're off! Work-trained dogs lunge forward in the harness at the beginning of the national title race



By Andrew Hamilton

ASHTON, IDAHO, is to dog-team racing what Madison Square Garden is to boxing, what Wimbledon is to tennis, what the Rose Bowl is to football.

On February 22, the shivering citizenry of the little potato-growing, wheat-raising community in eastern Idaho will literally "go to the dogs." It will take with it, however, some 10,000 spectators from all parts of the country who have gathered for the 31st annual running of the American Dog Derby.

A score or more dog teams will be entered in the speed race for the national title and a \$1000 first prize. Driver of the second gang of hounds to puff across the finish line will receive \$750; third place winner will get \$500.

The American Dog Derby was born during a conversation in Jay Ball's barbershop in Ashton one cold, wintry day in 1917. Jay had been reading about dog teams and the famous Scotty Allen, winner of many arctic races. George Zarn and "Tud" Kent were in the barbershop when Ball said:

"I see where runnin' dawgs over in Canada and Alaska have made a young fortune for Scotty Allen."

That touched off a discussion among the three men that continued long after the

last hair had been snipped and the last squirt of bay rum had been slapped on. It finally reached the point where the trio was beginning to ask: "Why not a dog derby for Ashton?"

So barber Jay Ball and his two customers, plus Gus Isenberg who ran the drug-store across the street, organized the first Ashton dog-team races in the early spring of 1917. The race was run over a 55-mile route from West Yellowstone, Mont., across the continental divide and down through some of the most beautiful scenery of the Rocky Mountains. "Tud" Kent won that year with a time of 29 hours and 23 minutes.

In 1938 the rough-and-tumble route across the continental divide, where snow sometimes drifted to depths of 12 to 15 feet, was abandoned. Instead, a speed race

Lloyd Van Sickle, last year's winner, and his lead setter "Red" delivered mail each day by sledge for years



K i n g



**o f t h e
m u s h e r s**

was adopted—five laps around a two-mile circle, with teams in sight at all times.

This year's American Dog Derby will be directed by the newly organized Dog Musher's Club. Its members are local ranchers and dog breeders. Idaho has the largest primitive area of any state in the Union, and dog teams are used throughout the winter to transport mail and supplies to snowbound areas. In addition to these practical aspects, the three-decade existence of the dog derby has stimulated the breeding, training and racing of "runnin' dawgs" in this part of the country.

Last year's race was won by Lloyd Van Sickle with a "mixed" team (several different breeds). At that time Van Sickle was a U. S. mailman who carried from 50 to 200 pounds of letters and packages daily by dog sled to the little village of Drummond, 12 miles from Ashton. He's been running dog teams for 20 years now, having won the derby also in 1936 and 1937 at the age of 16 and 17. He's tabbed the favorite again in 1949.

The American Kennel Club recognizes four distinct breeds of sled dogs. They are: (1) the Alaskan Malamute, a heavy, powerful animal with a distinct, caplike marking over the head; (2) the Eskimo, developed in eastern Canada and Greenland; (3) the Siberian Husky, a medium-sized animal which is the fastest of the four breeds and which holds most of the racing records; and (4) the Samoyede, a slightly smaller sled dog, developed in Russia.

It is a rarity, however, to see a full-blooded team of any one particular breed. Many other so-called "domestic" breeds are trained as sled dogs and raced in the Ashton Dog Derby: German and Belgian shepherds, St. Bernards, collies, Irish setters, Doberman pinschers, Airedales and greyhounds. The most unusual dogs that will be entered in this year's race will be a team of Afghan hounds—strange-looking animals with wide paws and silky hair that were once royal watchdogs of Egyptian pharaohs 3000 years ago.

Over the years, a wide variety of sledges, sleds or sleighs—take your choice—has been developed for dog-team work. The four best-known types are: (1) the Nansen double-end freight sledge; (2) the Antarctic freight sledge; (3) the basket-type sledge; and (4) the Kematik, a Greenland development. In the Ashton races, the basket-type sledge in several variations is preferred.

Sledge runners are made of close-grained hickory with upper parts of ash or oak. The Nansen and Antarctic types, which have no handles, are fitted with "gee poles" to aid in starting and stopping. The basket-type is equipped with a foot brake which claws into the snow.

Experienced mother helps as pups get their first training by learning to pull a log



Right, half-grown dogs pull a training device made from a Model-T Ford chassis across the rocky hills of Idaho. They later will be broken to pull a sledge

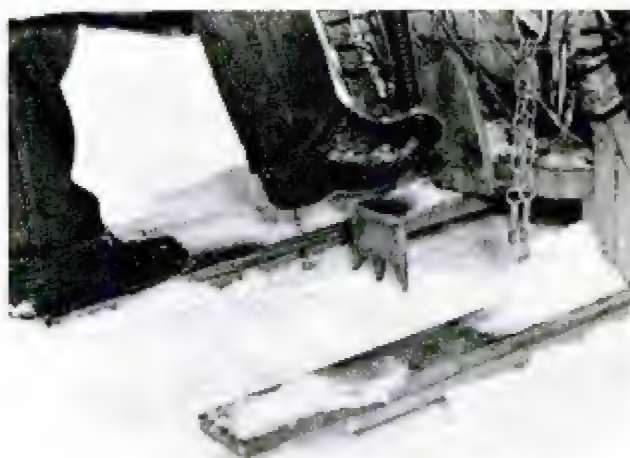




Dog-team racing and skiing, both growing in popularity, here are combined into one thrilling winter sport

The harness used on dog teams is an important part of sledging equipment. If it is ill-fitting or an improper type, it will impair a dog's pulling power and may injure him. Proper harness puts the pulling strain on a dog's shoulders and chest. Materials used for harness are leather, webbing or lampwick. Most mushers prefer webbing because it is cheap, strong, easy to sew and doesn't become stiff in cold weather as leather does. Besides, dogs don't chew it as they sometimes do leather.

Drivers use a wide variety of commands, and dogs will respond readily to any word they hear regularly. The starting command

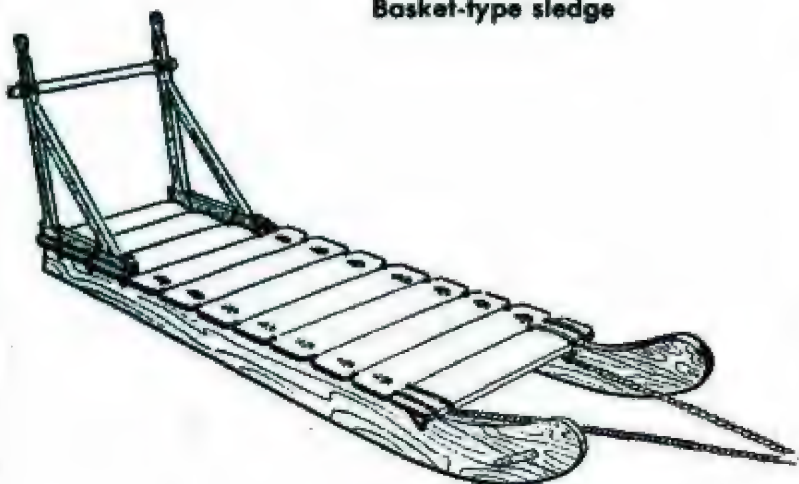


Above right, toothed brake plows through snow to slow sledge. Below, two racing teams near the halfway point

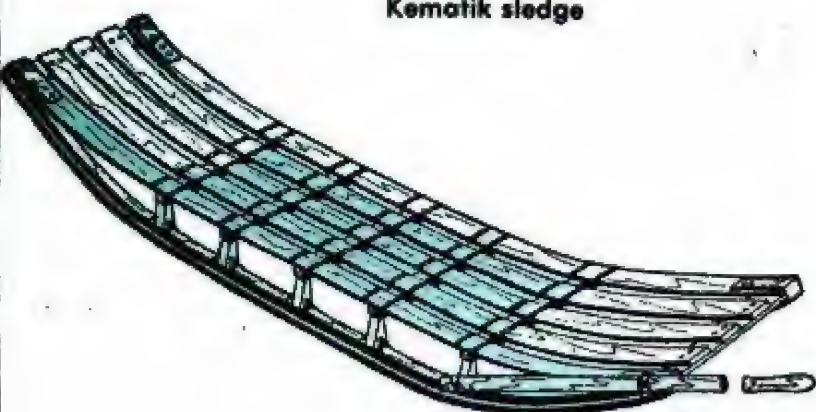




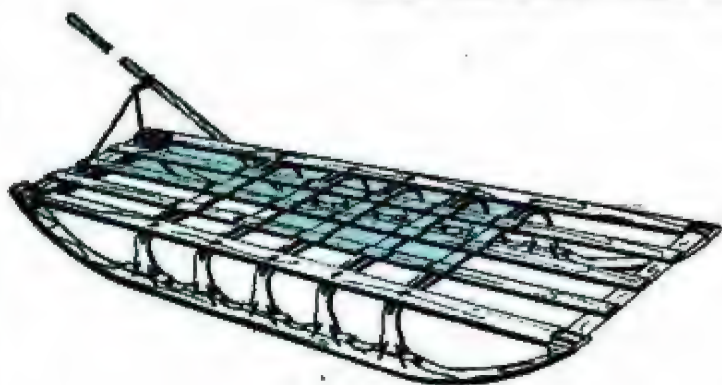
Basket-type sledge



Kematik sledge



Nansen double-end freight sledge



Antarctic freight sledge



Drawings on this and opposite page reproduced from Field Manual 25-6 by permission of the Department of the Army

† Most drivers make their own harnesses from leather, webbing or lampwick. Left, these are the most popular sledges as they appear in an Army training manual

"mush" is a corruption of the French word "marche" and it has been used for many years in Alaska and Canada. In recent years, however, the command "yake," first used in the Antarctic, has come into favor. "Hike" and "all right" have also been found effective as starting commands. A dog team should be trained to sit down or lie down in the traces at the command "down."

The following are U. S. Army commands which are fast becoming standard dog-team lingo:

- (1) "Yake" or "all right" for starting.
- (2) "Gee" for a right turn.
- (3) "Haw" for a left turn.
- (4) "Whoa" for stopping.
- (5) "Haw, come in" for a turn around.
- (6) "Down" for sit down or lie down.

The training of a sled dog begins early. At Sun Valley, Idaho, the famous dog and horse trainer, Morgan Heap, begins to school his puppies at the age of three months. The pups run loose with a team for a few trips. Then they are placed in light harness and pull a log. Most sled dogs are eager to pull—once they get the idea of what is expected.

When a pup is strong enough, it is hitched into a regular team—either alongside another half-grown dog or its mother.

For the first-summer education of young dogs, Heap has developed a training device from a Model-T Ford chassis. It consists of a short-wheelbase frame, four light wheels, a steering wheel and a platform at the rear for the trainer. During the first summer, half-grown dogs pull this contraption over



↑ Team of Samoyedes gets under way at the start of the Ashton Dog Derby. Right, Army teaches these hitches. Each has its good points and limitations

fields and trails to get the feel of a sledge. During the second winter, they are hitched with a regular team.

Heap believes that a good lead dog is of primary importance to a team. Much care and attention should be given to the selection and training of this animal. "Time spent," Heap says, "will be rewarded by the tremendous amount of work and trouble a good leader saves the driver."

Some mushers claim that a bitch makes the best leader, but this is much disputed. Leadership is a natural gift and a dog must have certain definite qualities to be a leader. Obedience is one of them, for without it commands are useless. In addition, the lead dog must possess intelligence, speed and a considerable amount of natural authority. Some drivers declare, "You can tell a good lead dog just by looking at him."

In the American Dog Derby last year, Van Sickle gave much of the credit for his victory to his lead dog "Red," a powerful and intelligent Irish setter. Another lead dog that has almost become a legend of the Ashton races is the plucky little bulldog of "Windriver" Smith's team in the 1917 race. When his other dogs refused to buck huge snowdrifts, Smith put the bulldog in the lead. The pug-nosed, short-legged little fellow often disappeared from sight in the snowbanks, but he guided his team to the finish line.

The personality of the driver is as important to the winning of a dog derby as the dogs he drives, the sledges or the training. Some men are "naturals" when it

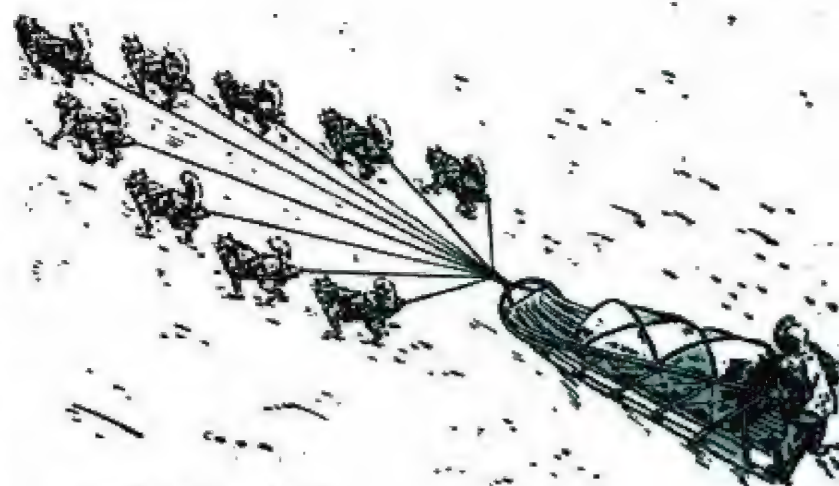
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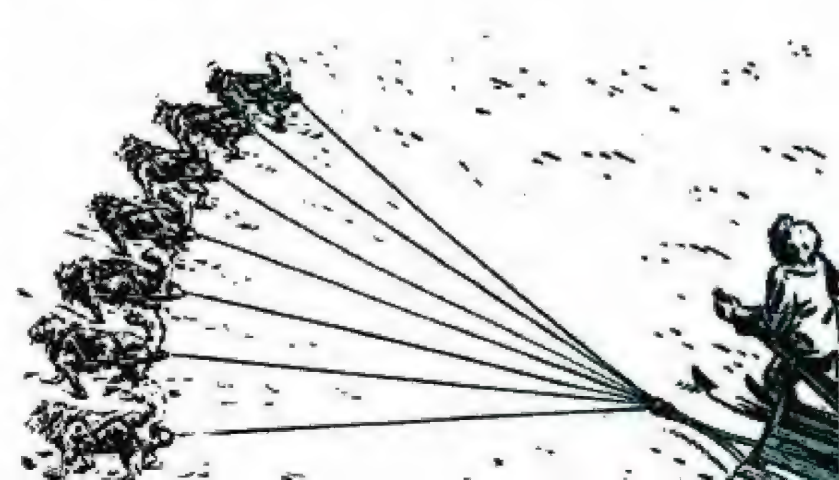
Double tandem hitch



Single tandem hitch



Modified fan hitch

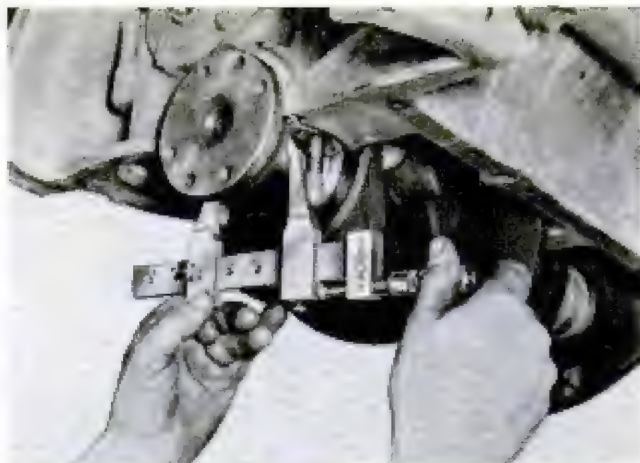




Official U. S. Navy photo

Carrier-Deck Polisher

Ingenuity saved the day when conventional polishing devices proved inadequate for the 700-foot-long hangar deck of the carrier USS Valley Forge. A canvas mat weighted with heavy wire spools was hitched to an airplane tractor and now the metal deck gets its daily burnishing with powdered graphite in less than an hour.

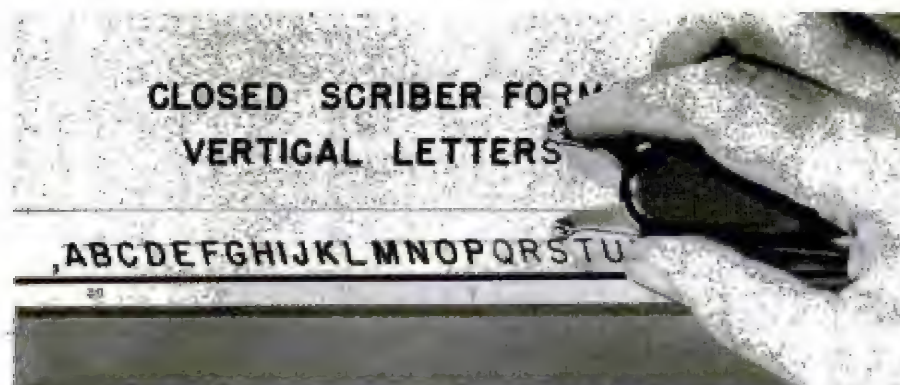


Micrometer Measures Journal With Crankshaft in Engine

Because it measures the diameter of any crankshaft journal up to five inches while the crankshaft is still in place, a special micrometer saves time in engine repairs. Diameters are read directly in thousandths of an inch over the entire range from zero to five inches. With the micrometer you can measure the exact size of main-bearing inserts, eliminating the trial-and-error method of fitting.



Neat lettering is easy with the template set shown in use above. A scriber, left, follows grooves in ruler-type template forming exact letters. Variety of templates is available

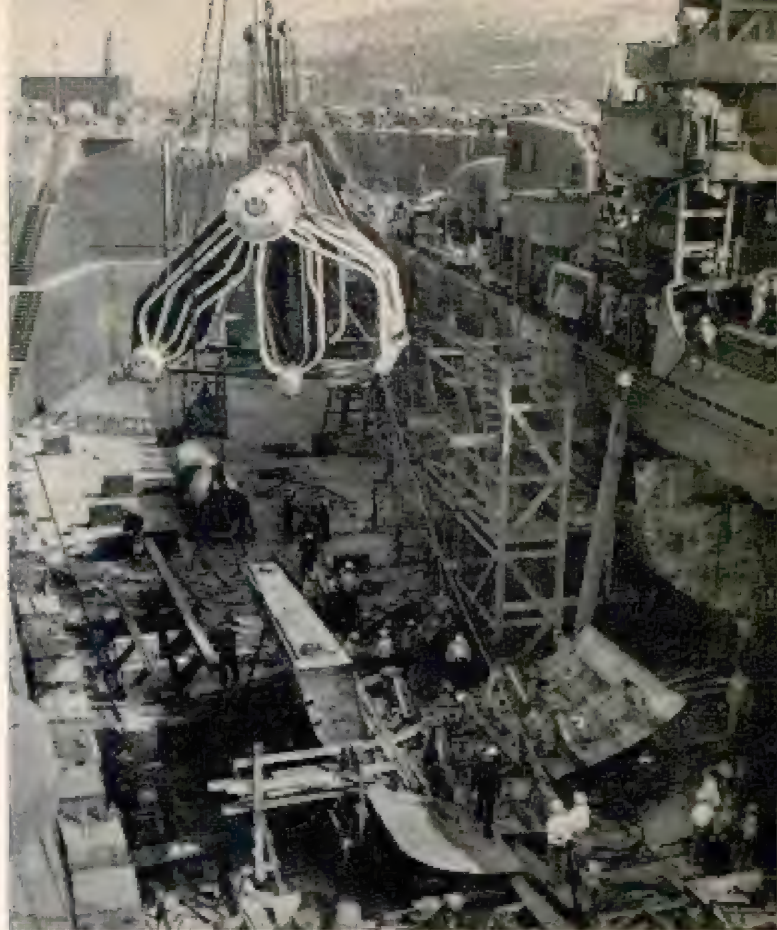
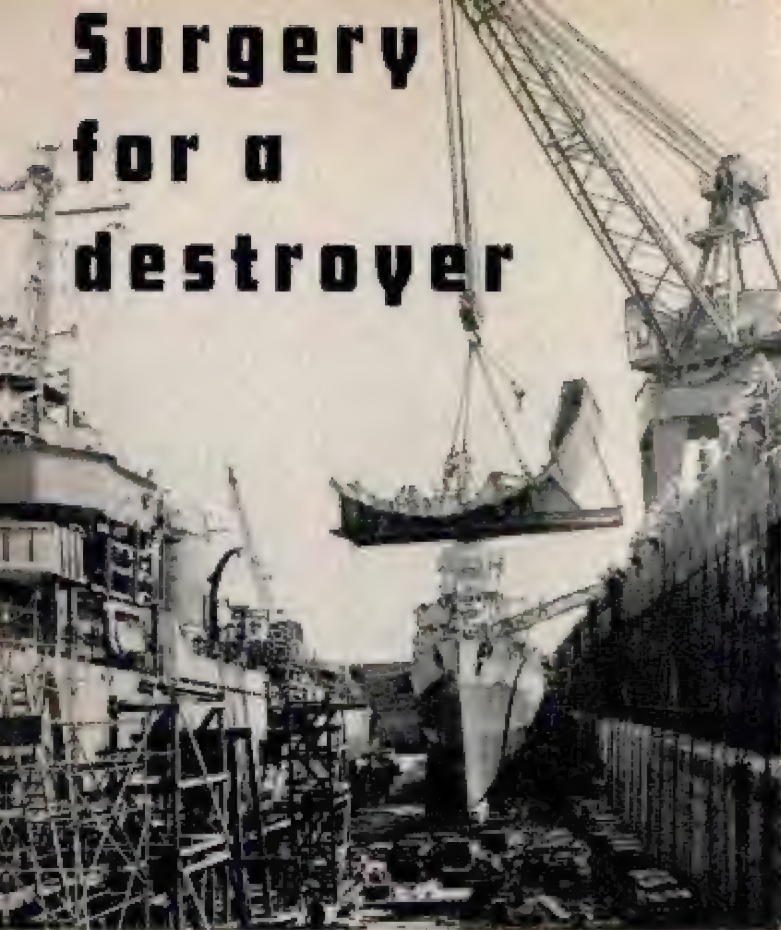


Lettering Scriber

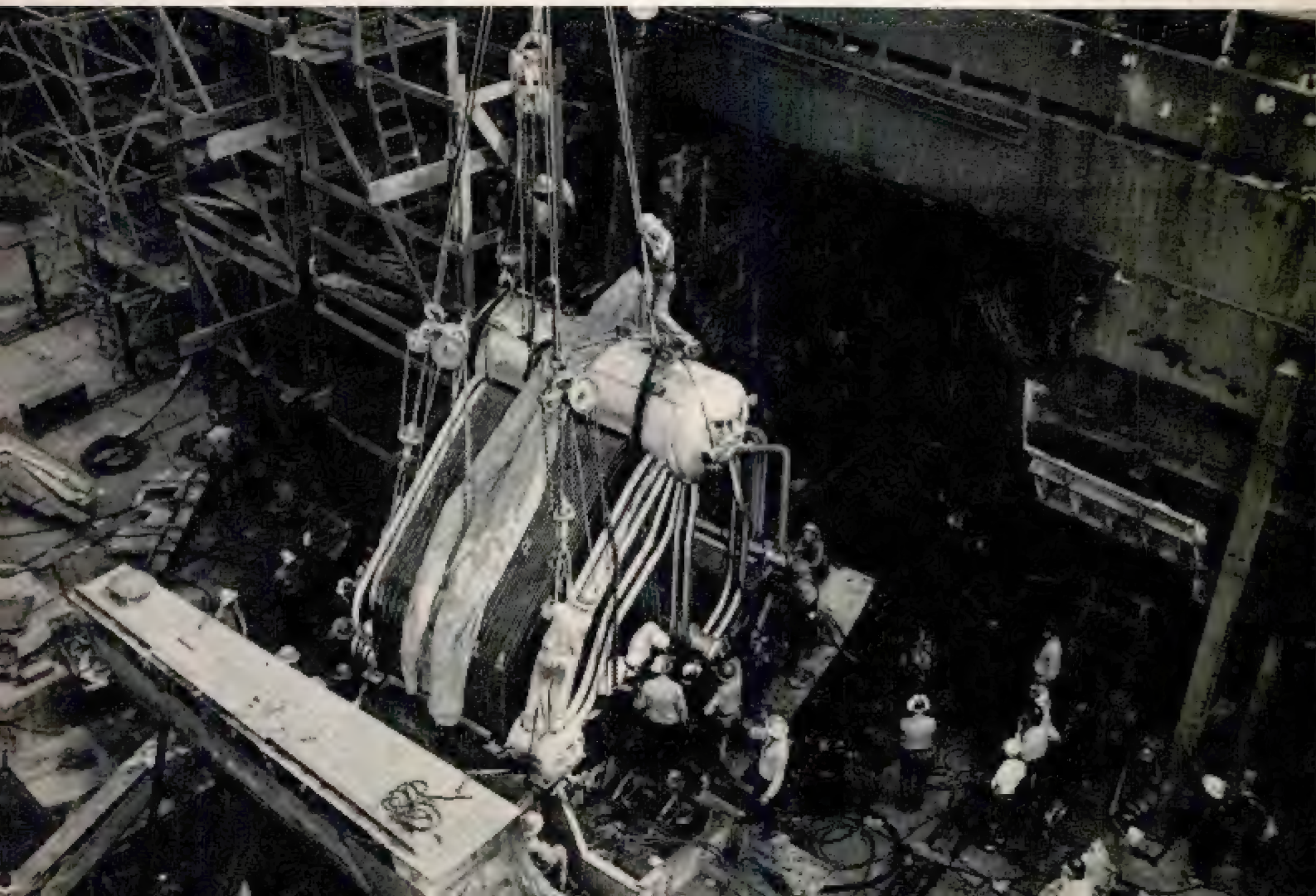
Persons without drafting experience can letter drawings with neat, even characters with the aid of a scriber that copies from templates. The templates are deeply grooved with letters of the alphabet, numbers or symbols. The operator traces desired letters on the template with the scriber's stylus. A pen copies the letters as he traces. Several different types of letters are available in sizes from .08 to 2 inches high. Additional templates have map and welding symbols. For draftsmen working on radio and electrical-circuit diagrams, a template containing standard symbols is available.

Studies by the U. S. Bureau of Standards show that the average car goes 21 miles per gallon at 20 miles an hour, 16 at 40 miles an hour, 11 at 60 miles an hour and 8 at 80 miles an hour.

Surgery for a destroyer



Fastest technique for replacing a destroyer's boiler is to operate on the hull. Former method was to disassemble the old boiler, remove it, bring the new parts aboard and build the boiler inside the ship. The top left photo shows how a large hull section is prefabricated before the ship even enters the drydock. Top right, the new boiler is assembled complete and lowered into the proper position on the hull section. Below, when the ship arrives, a section of the hull is cut out and the new section is slipped into its place. When all the boiler connections have been made, the hull section is welded and riveted and the ship is ready for sea



LENGTH: 12
TO 14 FEET

FINS

ALTIMETER
SETS OFF
BOMB AT
DESIRED
HEIGHTBATTERY
FOR FIRING
EXPLOSIVEEXPLOSIVE
DRIVES
FISSION
MATERIAL
DOWN
BARRELUPPER HALF
OF FISSION
MATERIALSAFETY
SHIELD

INSULATION

BARREL

SAFETY SHIELD

DEUTERIUM
WAX
SHIELDINGLOWER
HALF OF
FISSION
MATERIAL

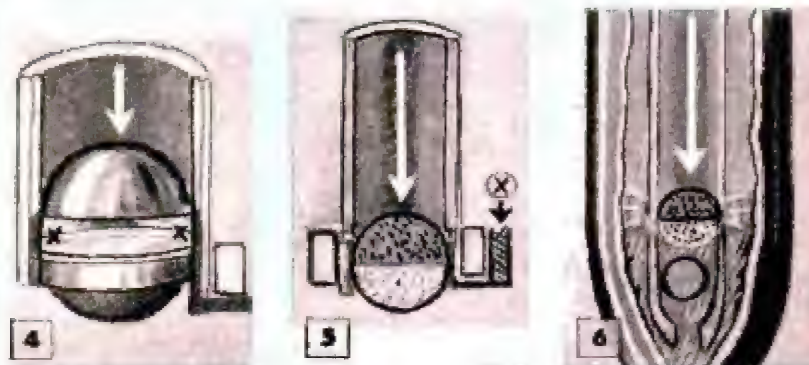
LEAD SHIELDING

BRAKE GROOVES

The Atom Bomb—



1. When the atom bomb reaches the desired height from the target, the altimeter fires a charge, driving the upper half of the fission material down the barrel. 2. The fission material, probably U-235 or plutonium, starts downward toward the nose of the bomb, traveling at a tremendous speed. 3. On its way down, the material bursts through two safety shields designed to prevent fission from occurring accidentally during handling



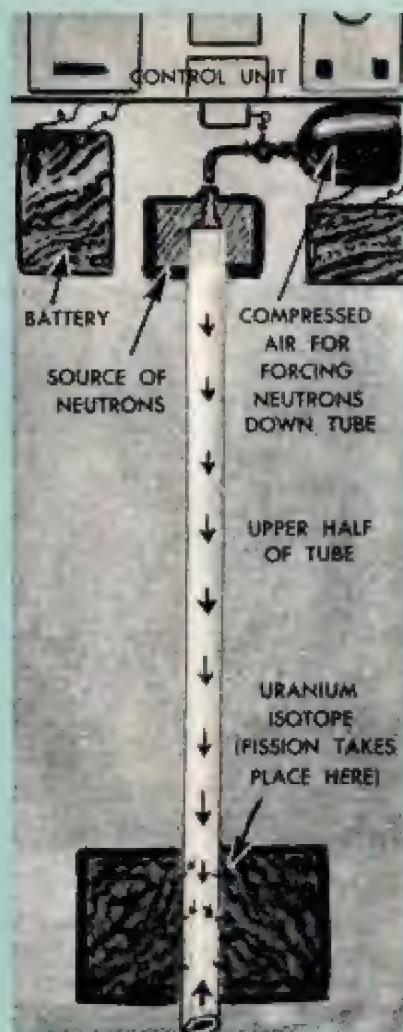
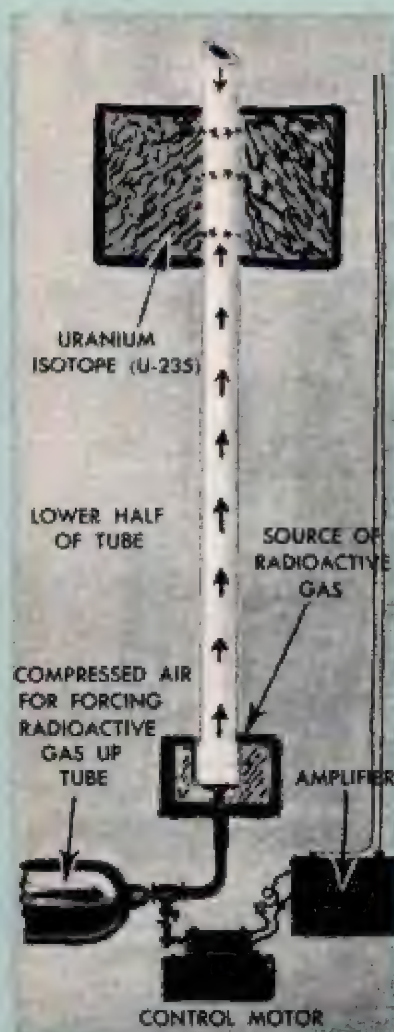
4. Two lugs, marked "X", sliding in grooves in the barrel, hit casing around lower fission material, knocking it away. Casing stops premature radiation. 5. Another shield, marked "X", is pushed aside as the upper half approaches the lower section. 6. Upper and lower halves come together to form the critical mass. Neutrons emitted from source of radiation go through a wax shield that adjusts their speed to induce chain reaction



7. Thrust together, the two sections of fission material are driven as a unit into the lead shielding in the nose of the bomb, compressing the grooves to make room for itself. 8. The lead shielding allows only a few neutrons to escape and holds the material together until fission is completed. 9. Because the bomb goes off in air, the blast is spread over wide areas

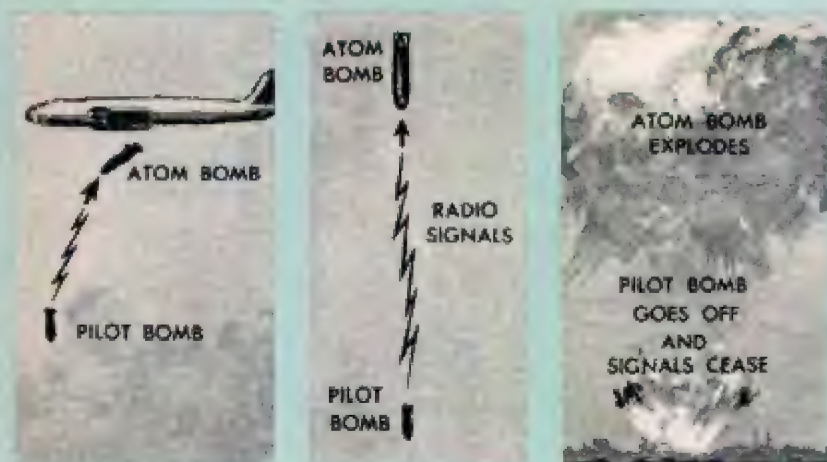
Left, drawing by G. H. Davis explains the atom bomb as it is conceived by A. R. Weyl, prominent British scientist. Details of the operation of the bomb are shown in the drawings above

Two Conceptions



The Russian conception differs considerably from that of the British scientist. Above left, radioactive gas is forced up from the nose of the bomb by compressed air. Simultaneously, right, more radioactive gas is forced down from the tail and these two constituents are blown through tiny holes into the fissionable mass (U-235), which is enclosed in deuterium wax

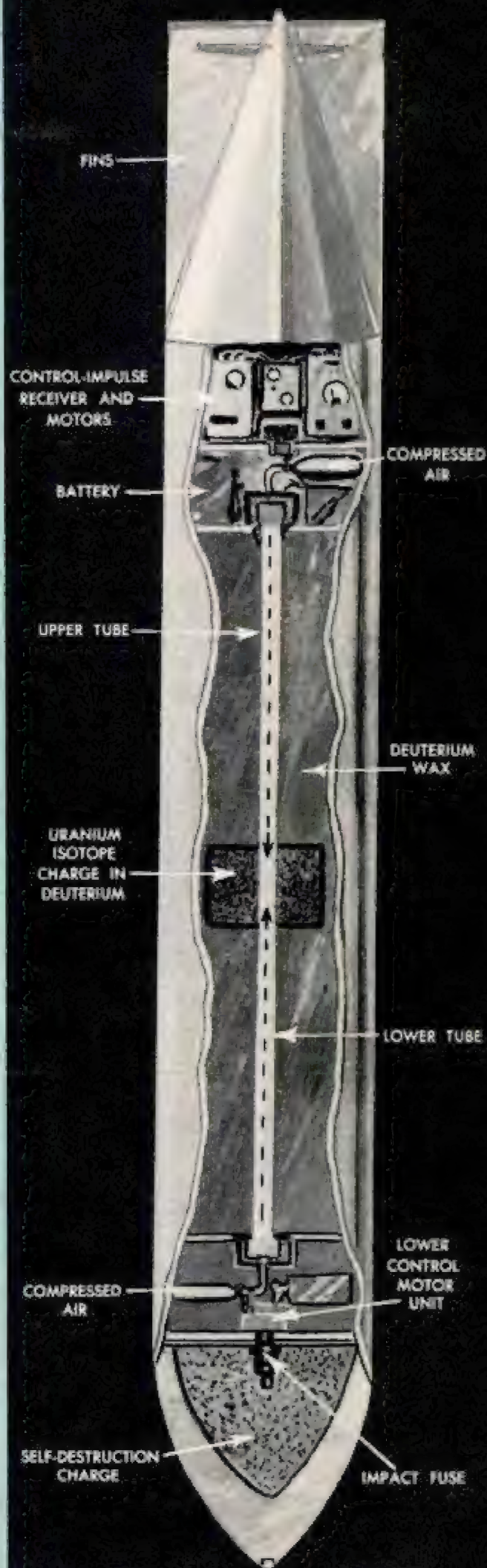
EXPLODING AN ATOM BOMB BY MEANS OF A PILOT BOMB



The A-bomb can be exploded by radio. A pilot bomb is released first and it sends radio signals to the atom bomb. When this pilot bomb hits the earth, signals cease, exploding the A-bomb

Right, the Russian conception of the atom bomb is based on an article published in the Russian zone of Germany. It could be controlled by radio signals (above) or by the altimeter method

RUSSIAN CONCEPTION





Sprayer Subdues Criminals

Anesthetic combined with an eye solution squirts in a fine stream from a "bomb" designed to subdue criminals. The "thug repellent" was invented by Charles L. Gebauer of Cleveland, executive of a chemical company. The Indianapolis police force is using the subduing fluid on an experimental basis.

Lawn Edger Uses Razor Blades

Razor blades are used to cut grass in a new lawn edger for trimming along sidewalks. Two single-edge blades are held at opposing 45-degree angles, making it possible to either push or pull the edger. A horizontal plate engages the edge of the sidewalk to guide in trimming the grass. When the blades become dull they can be removed and new blades installed.



Lever-Action Hunting Rifle Has Round Breech Bolt

Featuring a round breech bolt enclosed by a solid steel receiver, a new high-power lever-action rifle promises improved shooting performance. The round-bolt construction assures smoother functioning. The guns also have a redesigned carrier for positive feeding and a matte surface on the receiver for glare elimination.

Electric Machine Takes Footprints

Measuring pressures on various parts of the feet as you walk and stand still, an electrical footprint machine will tell you whether or not you walk normally and, if not, where the fault lies. Small disks are attached to the shoe or the bare foot and connected by cable to an oscillograph. The pressures are measured and recorded as curves on a continuous film.





Combining virtues of each type aircraft, long-distance plane tows a short-range helicopter (1) to remote site of air crash. At the scene (2), helicopter's engine is restarted, the tow is unhitched and a landing is made

AIR-TOW RESCUE

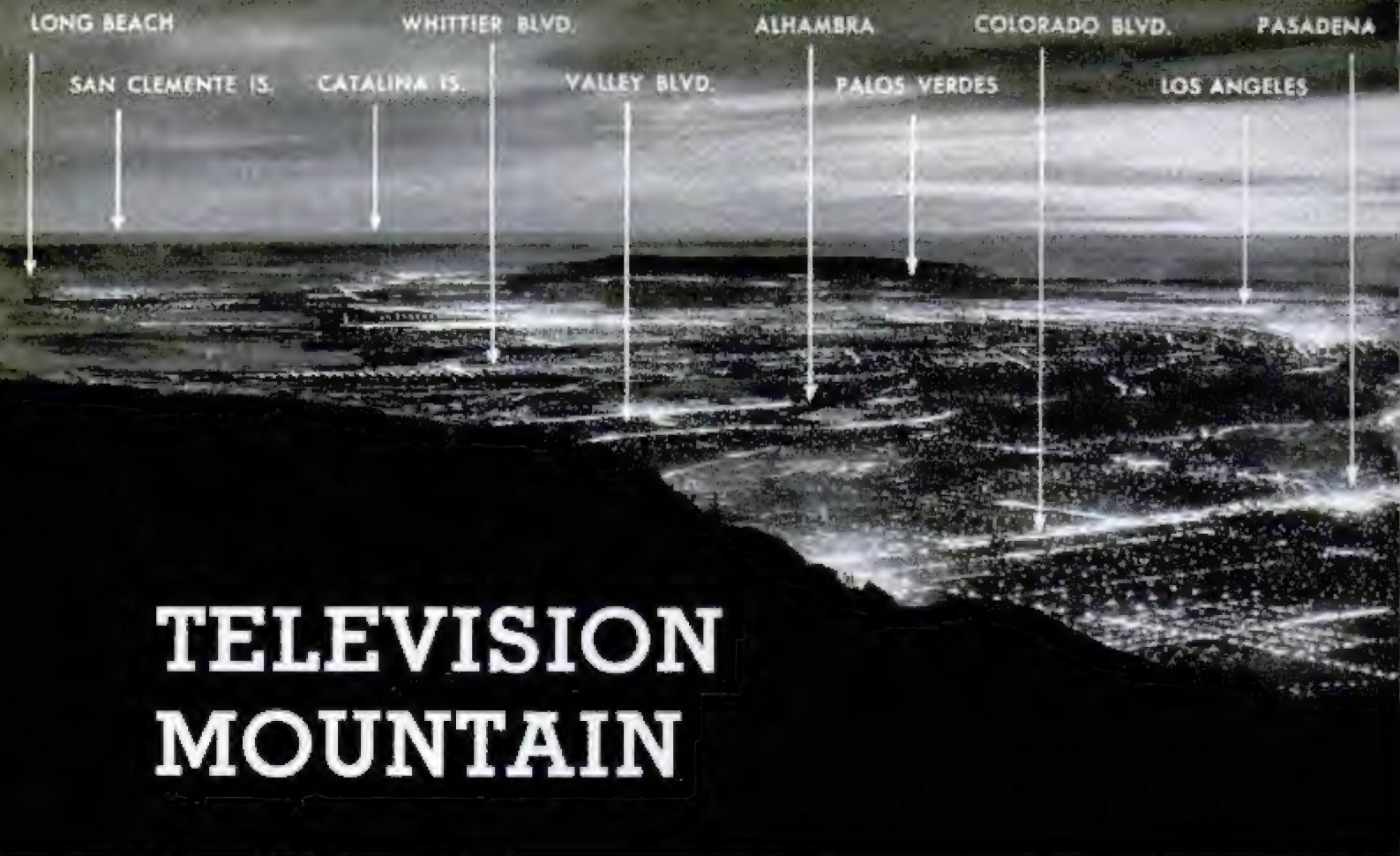
Landing at remote, inaccessible places, air rescue's chief problem may be solved by a combination of helicopter and plane being tested by the U. S. Air Force. Both take off under their own power, keeping a 300-foot towline slack during that critical period. The plane tows the helicopter, too short-ranged to do the job alone, to the rescue site. There the helicopter's engine is restarted, the tow unhooked and descent made. With the rescued aboard, the helicopter rises, makes a mid-air pickup of the towline and is pulled to an air base.

Plasecki Helicopter Corp. illustrations



After rescued are loaded aboard (3), helicopter takes off and makes a midair pickup of trailing line (4) for tow to the nearest air base





TELEVISION MOUNTAIN

THE DEER and bushy-tailed squirrels that live on Mount Wilson have been watching a strange new forest of "bat-wing" radiators and pylon antennas replace the trees that formerly grew on the mountain top.

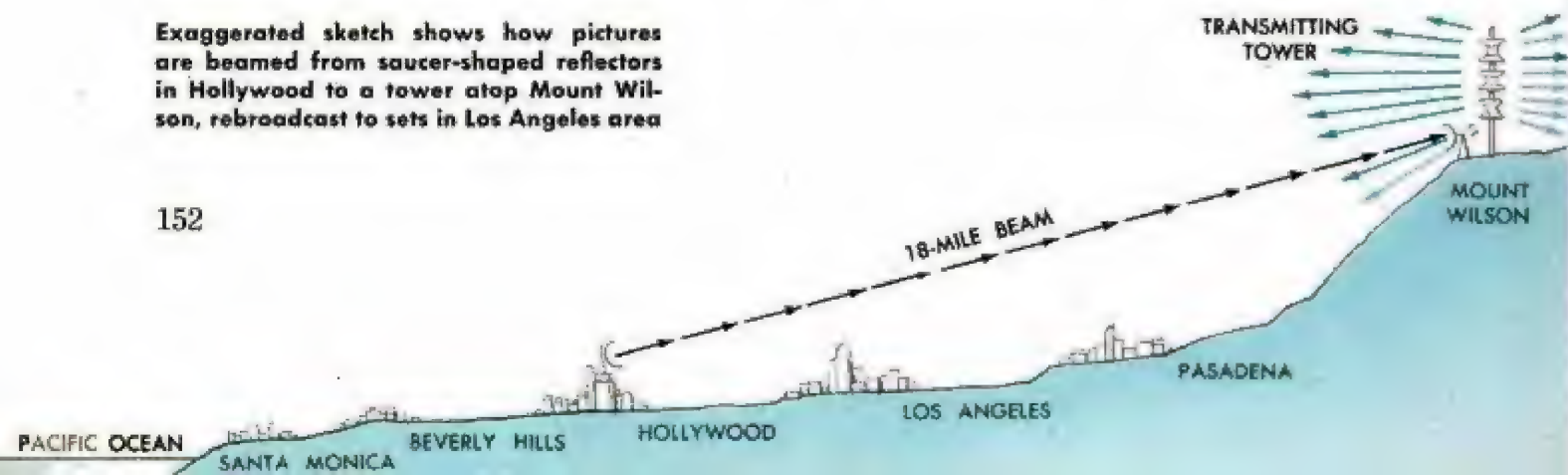
Seven new television stations and five new FM stations are grouped together on top of a small ridge not far from the famed Mount Wilson Observatory where the 100-inch Hooker telescope is located. Except for one transmitter that is a short distance from the others, all the stations are within an area about half a mile long and a couple of hundred yards wide.

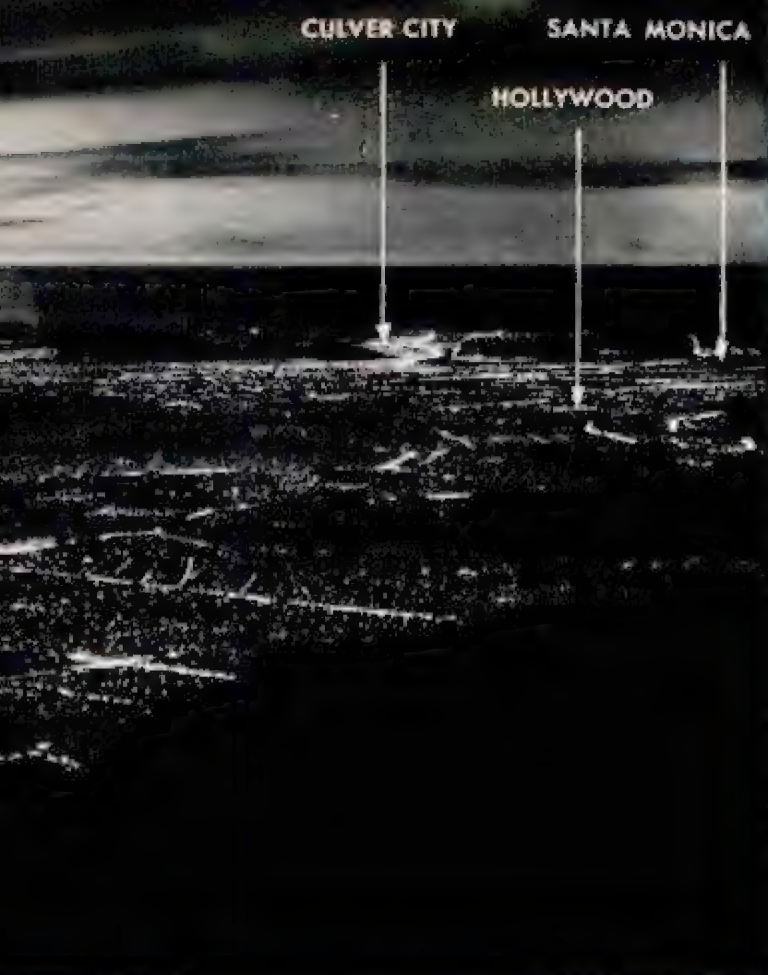
This unique crowding together of transmitters has occurred because, from the 6000-foot peak of Mount Wilson, there is a wide horizon for TV and FM, providing a service area that extends from Mexico and San Diego on the south to Bakersfield and Santa Barbara on the north. The sta-

tions directly overlook the entire Los Angeles metropolitan area in which are located most of the 60,000 television receivers of the region. The mountain top is no more than an hour and a half by road from the Hollywood television studios.

Seven of the stations are operating now and the others are almost ready to transmit their first test patterns and sound programs. As many as 19 different picture, sound and separate FM frequencies will be in use at the same time when all the stations are on the air. This is bound to lead to some confusion at first, but engineers are confident that within a few weeks after each new station comes on the air it will be possible to correct any interference. The differences between frequencies in the short waves, they explain, are about the same as standard broadcast stations operating on their regular frequencies while spaced 10 miles apart.

Exaggerated sketch shows how pictures are beamed from saucer-shaped reflectors in Hollywood to a tower atop Mount Wilson, rebroadcast to sets in Los Angeles area





CULVER CITY

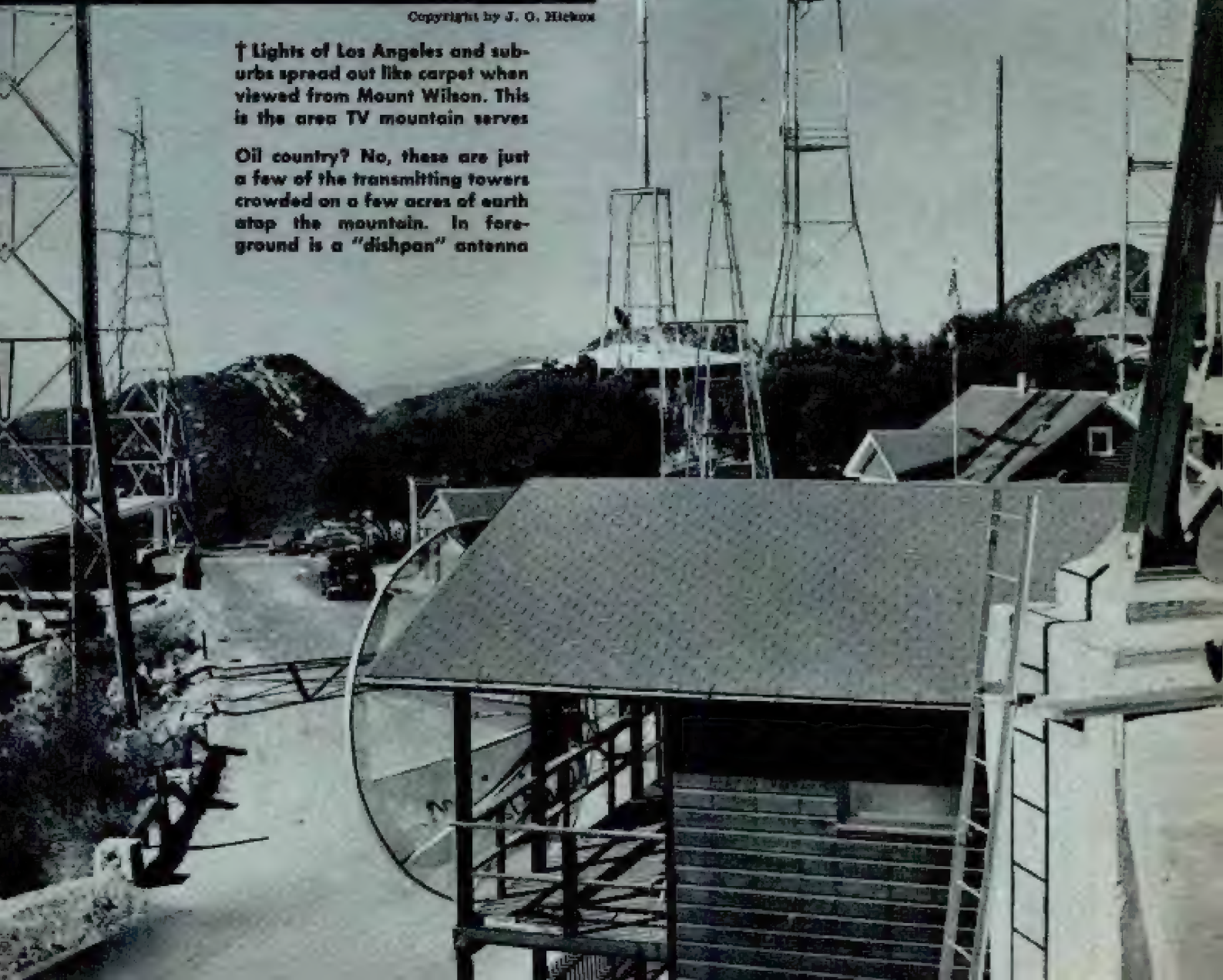
SANTA MONICA

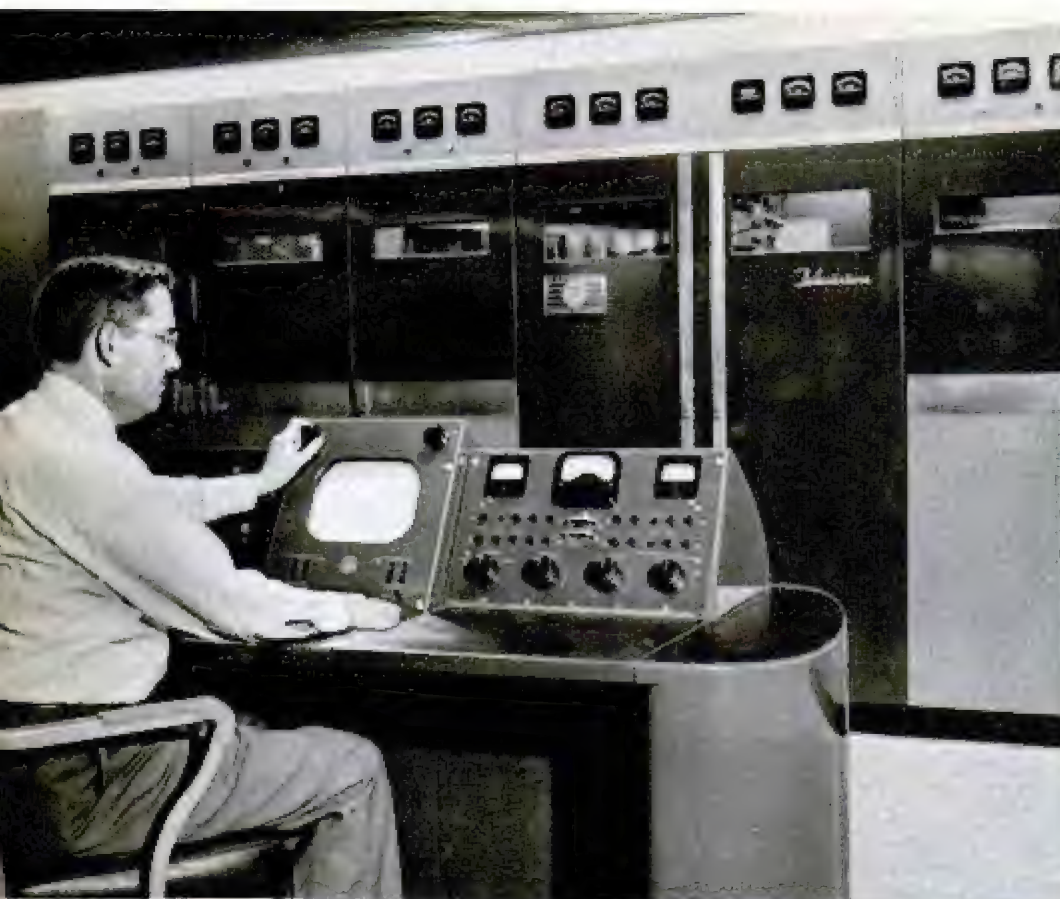
HOLLYWOOD

Copyright by J. O. Hickox

† Lights of Los Angeles and suburbs spread out like carpet when viewed from Mount Wilson. This is the area TV mountain serves

Oil country? No, these are just a few of the transmitting towers crowded on a few acres of earth atop the mountain. In foreground is a "dishpan" antenna





Console-type controls and monitoring screen are used in new NBC station

An advantage of concentrating all the stations is that a television-receiving antenna down in the lowlands will pick up all of the stations equally well and may be pointed permanently toward the mountain. It won't be necessary to rotate the antenna for best reception when switching from one station to another.

Each station is simply a big transmitter.

From a mobile truck-station technicians beam TV program to Mount Wilson



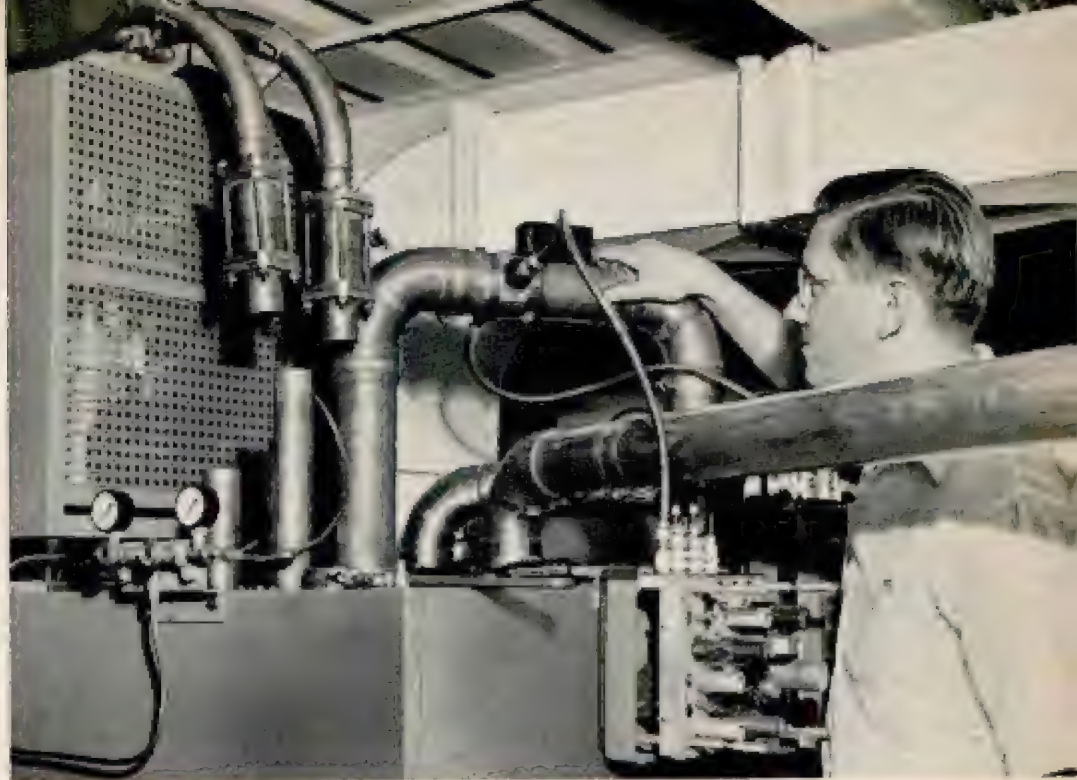
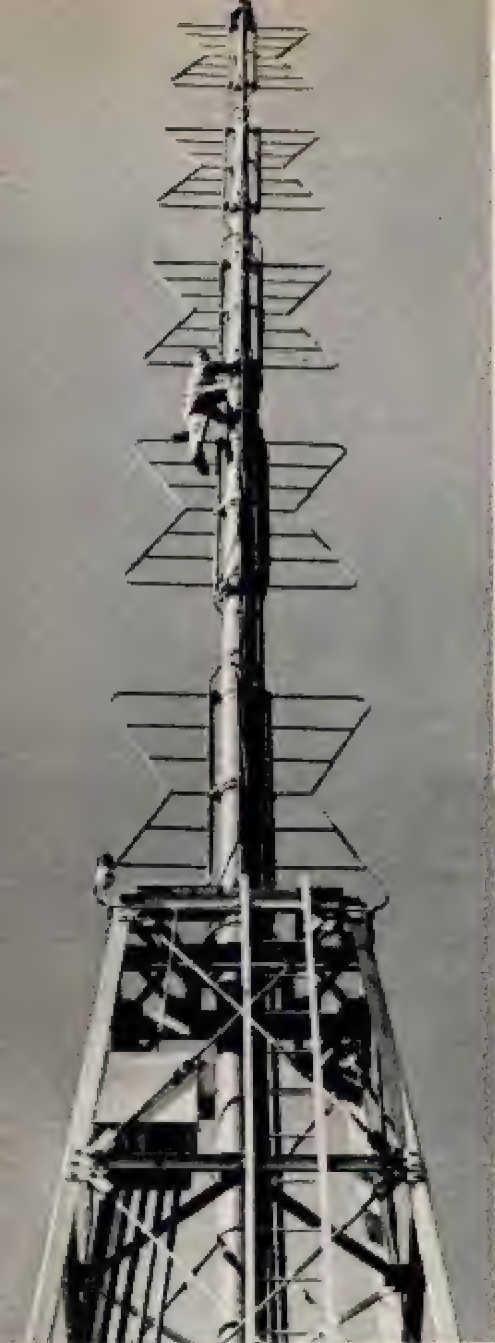
All the programs originate in Hollywood or Los Angeles or at other points and are relayed to the mountain for broadcasting. FM goes up the hill by telephone cable, as do some of the TV sound programs. All video and, in some cases, the accompanying sound as well is transmitted to the mountain by microwave radio beam. KTLA, for instance, has big parabolic reflectors on top of its Hollywood studio and other reflectors at its Mount Wilson station 18 miles away, in line of sight. Pictures and sound are beamed from the studio to the transmitter and are radiated back over Hollywood and the surrounding country. When KTLA is televising a remote program, such as a baseball game, it sends a mobile beam transmitter

out to the location and either beams the program direct to Mount Wilson or else back to Hollywood, from which point it is relayed by radio to the mountain.

Some of the television stations have installed their own beams, while others are using a radio link provided by Pacific Telephone and Telegraph Company. The phone company has erected its own building

on the mountain for receiving the beamed programs that it handles, and for relaying them to the adjacent transmitters by coaxial cables. The microwave receiving antennas are mounted side by side in a large room inside the building instead of on the roof, where they would be exposed to the weather. The exterior wall of the room, in front of the antennas, consists of one large window of transparent plastic sheeting that offers no resistance to the incoming high-frequency energy.

The building also serves as one of the radio receiving and transmitting points for the phone company's mobile urban and mobile highway ra-



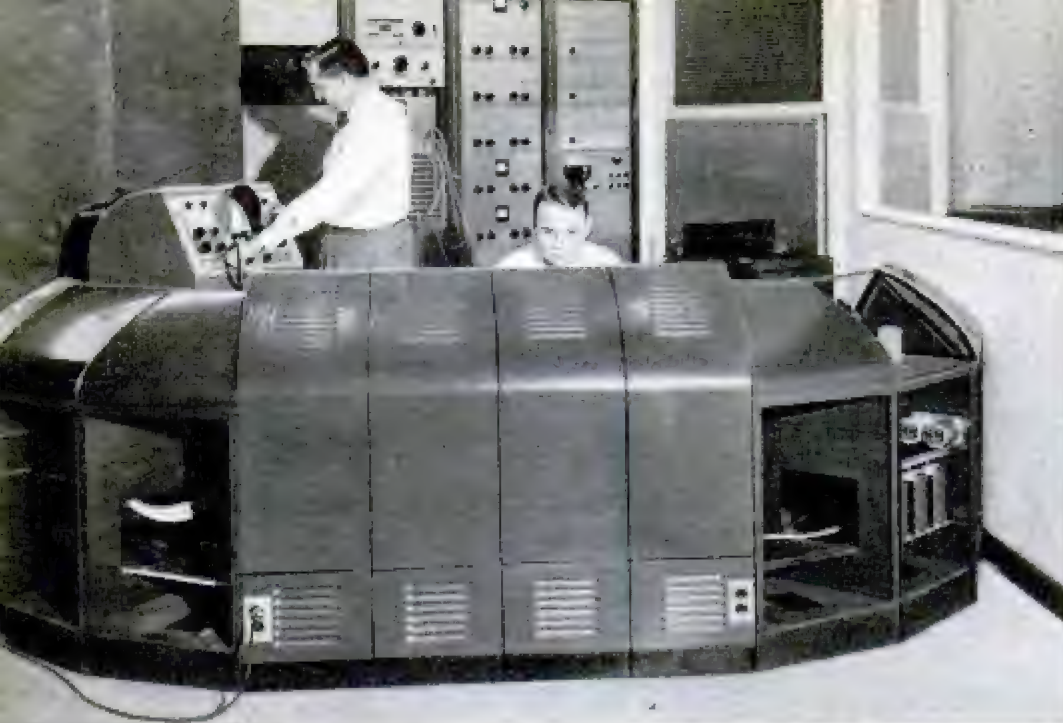
Wave guides—hollow copper tubes—conduct the high-frequency television energy from the station's transmitter to its tallest antenna

radio services which together have about 150 subscribers, mostly public utilities, doctors and trucking concerns. Also in the building is a small switchboard that handles the phone calls of the new radio community.

Typical of the television stations on Mount Wilson is the new NBC transmitter, KNBH, built at a cost of half a million dollars. It is equipped with a standard RCA TT-5A transmitter that puts an effective radiated power of 27.5 kilowatts (for picture) on its five-element superturnstile antenna. Three picture chains and two sound chains are available in the transmitting room. If any one circuit develops trouble, the operator can switch to another chain at once. Nine hundred different tubes are in use when the station is on the air. The main picture

Above, turnstile tower has 20 "batwing" elements (half at right angles). Below, left to right, four dishpan antennas pick up incoming sound beams, studio picture beams and pictures from two mobile transmitters





Control console at NBC station has four screens for monitoring pictures

and sound-transmitting tubes are air-cooled by means of blowers and are water-cooled by means of internal piping. The station has its own distilling plant for creating pure water for cooling tubes.

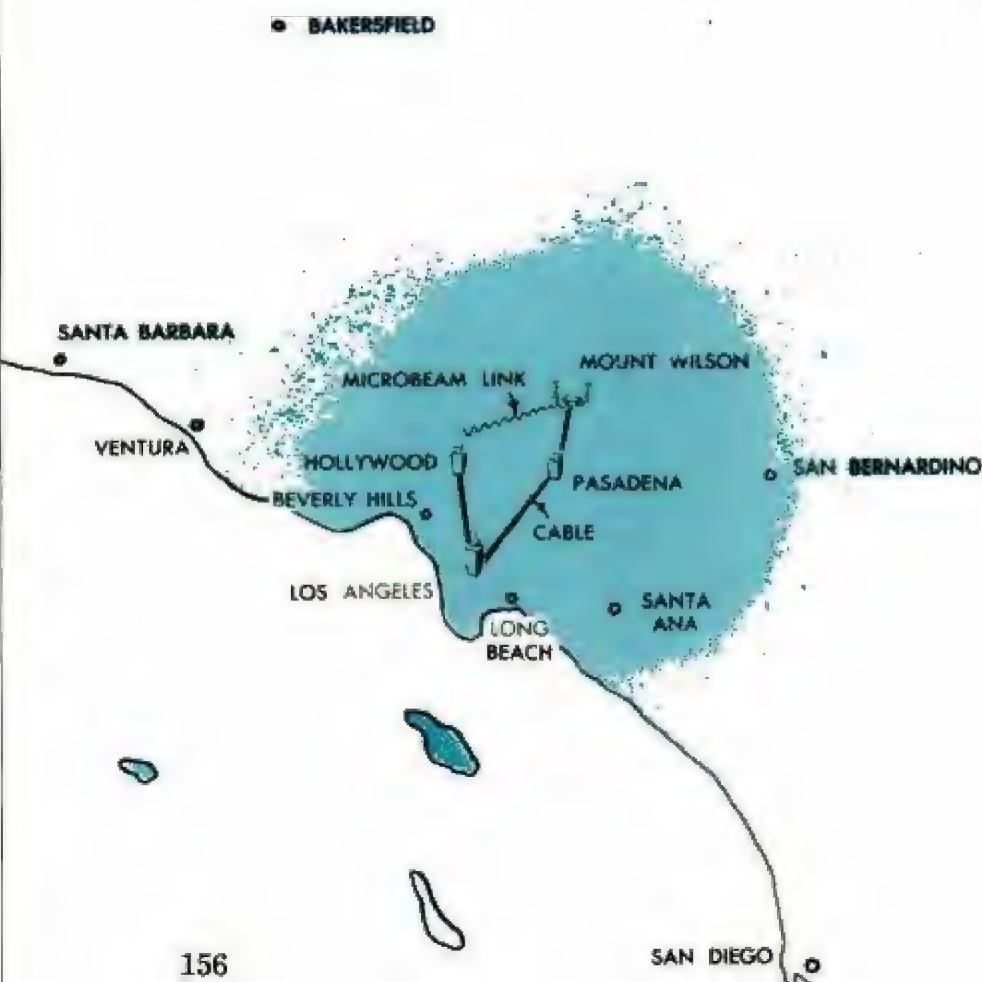
The station building also contains a three-room apartment for its caretaker; for emergencies it has a bunkroom in which four operators may sleep, and an electric kitchen equipped with a freezing unit and stocked with enough food, frozen and canned, for three months.

their antennas. Winds as strong as 85 miles an hour have been recorded, with gusts estimated at 100 miles per hour. All antenna towers have been designed with this condition in mind.

Icing conditions occur during the winter months and rime ice may build up to 10 times the diameter of the member on which it collects. To avoid any possible detuning of an antenna because of the ice load, most of them have been provided with internal electrical strip heaters to keep them warm. One 500-watt heater is placed inside each lobe of each batwing, a total of 20 heaters for a five-element superturnstile.

All the TV, FM and combination antennas are grounded direct to the earth, this being permissible because short-wave radiation is a matter of resonance tuning rather than insulation. Normally, a grounded antenna would dissipate the energy of any lightning bolts, but on Mount Wilson the thin layer of topsoil overlies a rock formation that is not an ideal conductor. At the Don Lee TV and FM stations more than half a mile of copper

(Continued to page 254)



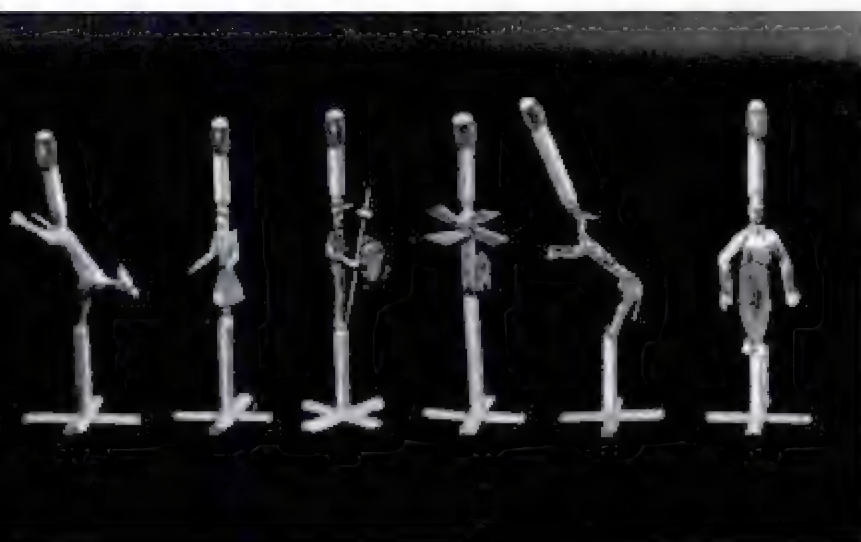
Map shows location of Mount Wilson and the area it blankets with television and FM broadcasts. The limits of the range are Santa Barbara, San Diego

Railroad Sleep Hanger

For railroad travelers, Dr. Igo Seeger of Vienna has come up with a sleep hanger that holds the passenger in a comfortable sleeping posture while sitting upright. The hanger is supported from overhead by an adjustable strap. A shelf holds the folded arms of the traveler, while another shelf has a pillow to support the head.

Wax Paper Seals Itself To Keep Food Fresh

Sandwiches and other foods stay fresh longer when wrapped in an adhesive wax paper that is self sealing. One side of the wax paper is coated with a sanitary adhesive that will seal itself, but will not adhere to anything else. You merely wrap the paper around the food and press the edges together for a complete seal.



Matchstick Stories

Telling stories with matches is the hobby of Martin Saldana C. of Mexico. He carves common matchsticks to form the figures of the story. One of his groups includes Don Quixote, his horse, squire, the squire's donkey, a woman of the story and the famous windmill. Another set depicts the episodes in a popular Mexican cowboy song. The tools used are a razor, pin with a small head and the hair from an art brush stuck to a toothpick. All the figures are painted with water colors.

Heat-Resistant Plastic

Plastic of the polystyrene type now can be molded into products that must resist heat without shrinking or fading in color. In the past, plastics of this type had little resistance to heat. The new plastic, which can be left in boiling water for 15 minutes with little change, can be molded into tea strainers, knife and fork handles and radio cabinets which may develop hot spots from the tubes. A change in the molecular arrangement gives the plastic its heat-resistant properties. The material can be molded into transparent products or it can be colored uniformly.

Both of these radio cabinets were made from polystyrene, but the ivory one was made from the new type. It has resisted a boiling-water bath for 10 minutes





armed with a camera . . .

A Mississippi professor does battle with insect adversaries, snakes and birds. His masterpiece is a "still life" study done by the light of the firefly

By Stuart Covington

Professor Hutchins gets ready to photograph the rhinoceros beetle in the museum at Mississippi State College. He is using the field camera here. Below, photograph of the harvester ant shows the extreme clarity of the pictures made by Hutchins



DID YOU ever look the *Camponotus* (*Colobopsis*) *mississippiensis* in the eye? Prof. Ross Hutchins of Mississippi State College has—with a camera, and the experience resulted in some of the weirdest photographs ever recorded on film. In his laboratory, the professor has accomplished feats which no other man has duplicated. The frolic with the *Colobopsis* was only one of them.

"Some of Nature's strangest works can be found right under your nose, if you only take the trouble to look for them," claims the professor of entomology, but he has roamed thousands of miles through every state in the union in search of targets for his camera. The result has been thousands of invaluable close-ups of American fauna, ranging from parasol ants to vicious chicken hawks and deadly copperhead moccasins.

Professor Hutchins uses two cameras: one in the field and another in the laboratory. His field camera, a view type with a long extension, is used for snapping subjects that cannot be captured and for the action shots in which the professor excels.

The laboratory model is Hutchins' personal brain child and required a month of spare time to create. As far as Professor Hutchins knows, there is no other like it. Originally a 4 by 5 view camera, it is now equipped with a solid plywood extension approximately three feet long. Captured insects are placed on an adjustable stage, controlled by the rack and pinion from a

discarded microscope. The stage is illuminated by a 500-watt spotlight and a photo-flood lamp. A microscope mirror deflects light to the subject. Because of the long extension, subjects may be placed almost in contact with the lens and a clear image obtained. This permits photographing of various sections of an insect's anatomy. Due to the camera's unusual length, three seconds' exposure is standard, though Hutchins has obtained photos in less time.

Hutchins and his cameras are fighting a battle which is beginning to pay dividends for the farmers of Mississippi. The professor has identified photographically every crop-damaging insect besieging the farmers of his state. His photographs have been reproduced in booklets issued by the Agricultural Experiment Station of Mississippi State College and are distributed free to farmers and used as texts by agricultural students. Armed with these unmistakable descriptions of their adversaries, farmers, county agents and agricultural extension workers are able to put the finger on the crop killers as soon as they invade new fields, often averting thousands of dollars of damage to plants.

One of Professor Hutchins' rarest subjects was the aforementioned *Colobopsis* ant. An industrious and highly destructive creature, it sets up living quarters in a hollowed-out white-ash twig. Warriors of the tribe have plug-shaped heads with which they block the nest's entrance to intruders. Other ants are admitted only after they signal by tapping on their kinsmen's plugs. With much patience, the professor was able to photograph this procedure.

Another oddity was the rhinoceros beetle, so called because of a peculiar horn-like projection jutting from its forehead. A third was the parasol ant, which carries leaves atop its body as though they were huge umbrellas. Once Hutchins made a vivid set of color prints of a single termite. Another session with the camera produced an unusual portrait of a louse. A third tiny subject was a microscopic aphid.

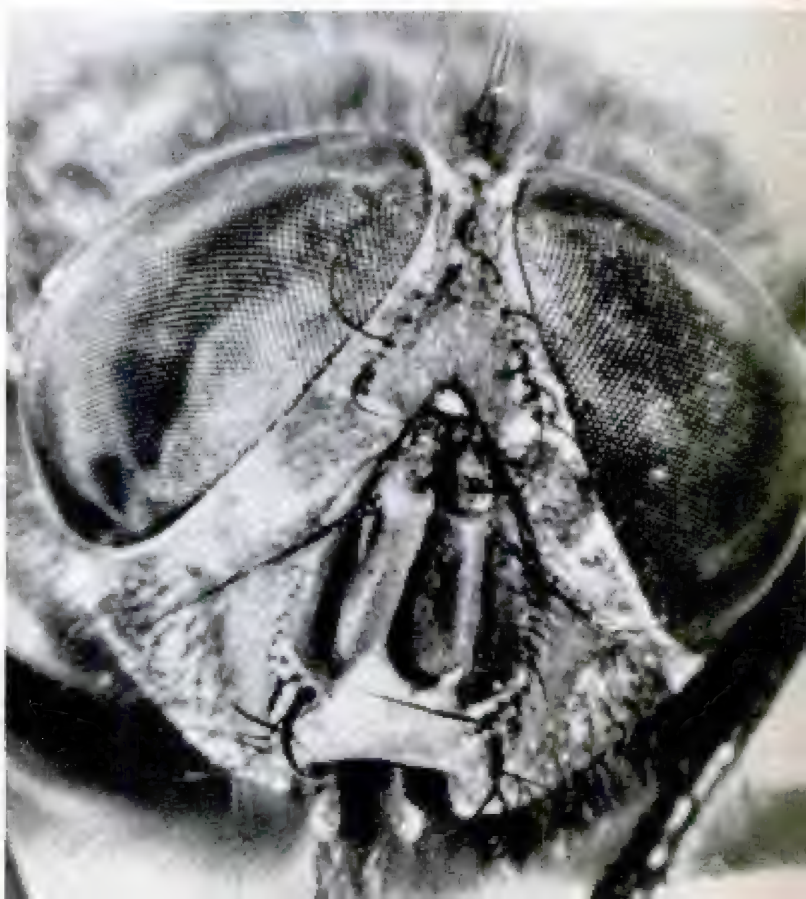
The Hutchins camera has been trained on over 100 varieties of fish, hundreds of butterflies, moths, birds, animals and snakes. Reptiles are perhaps his favorite subjects, though they have brought him some uneasy moments.

A less deadly adversary was the bomber



No photoflash bulbs were used for this picture. It was taken with the light from a group of fireflies

Below, with his laboratory camera, Hutchins takes such enlarged photographs as this one of a housefly





Above, the camera catches the praying mantis in the middle of a meal. He holds a grasshopper with his forelegs as he eats it

Right, a dentist's view of the copperhead moccasin! Its mouth is held open by a large paper clip. Reptiles are a favorite subject for Hutchins' cameras

Below, this enlarged view of a rhinoceros beetle clearly shows the curved tusk on its forehead that gives the insect its name



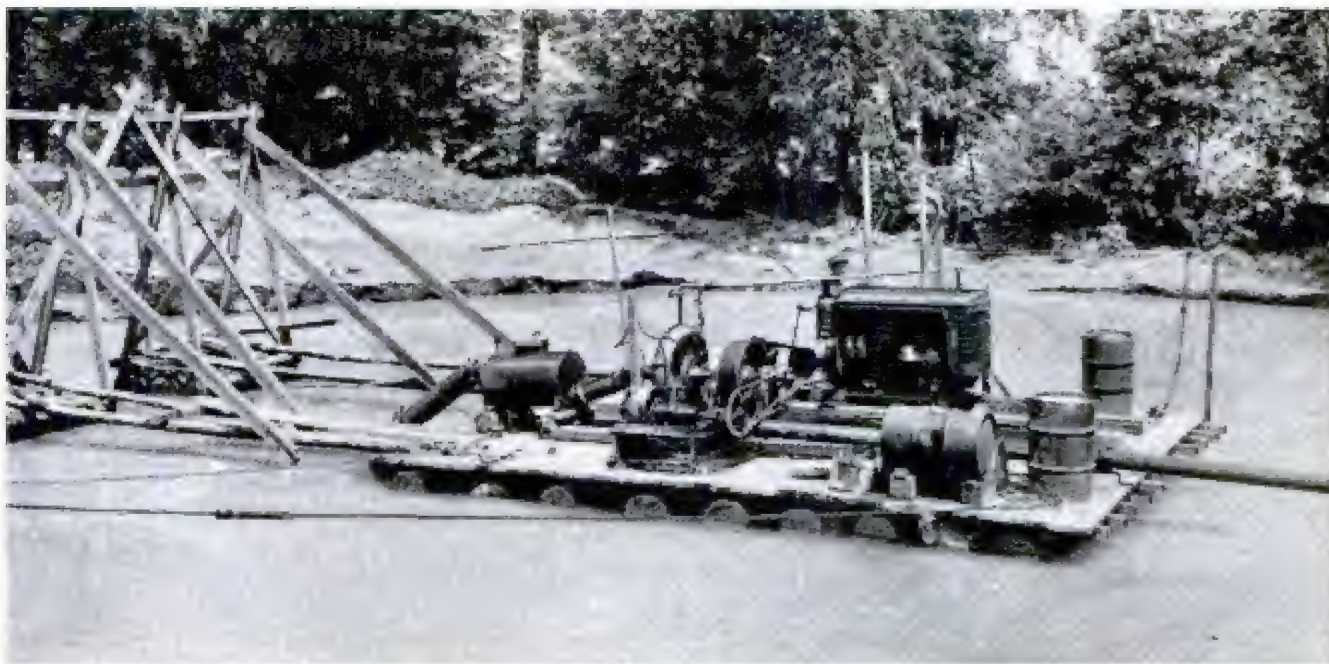
beetle, an entomological specimen which Professor Hutchins dubbed the "gas bomb of the insect world." When captured, the inch-long beetle ejects a tiny cloud of thick, choking gas which, on a small scale, has the same effect as tear gas.

Hutchins' rarest accomplishment has been a photograph illuminated entirely by the light of fireflies. A group of glowworms was placed in a rough semicircle about the edge of a tiny statuette and, using the insects' feeble radiance as a substitute for a floodlight, Professor Hutchins took several dozen photographs, all of which are sharp in detail. The fireflies provided an eerie glow, which created a startling effect of delicate indirect lighting.

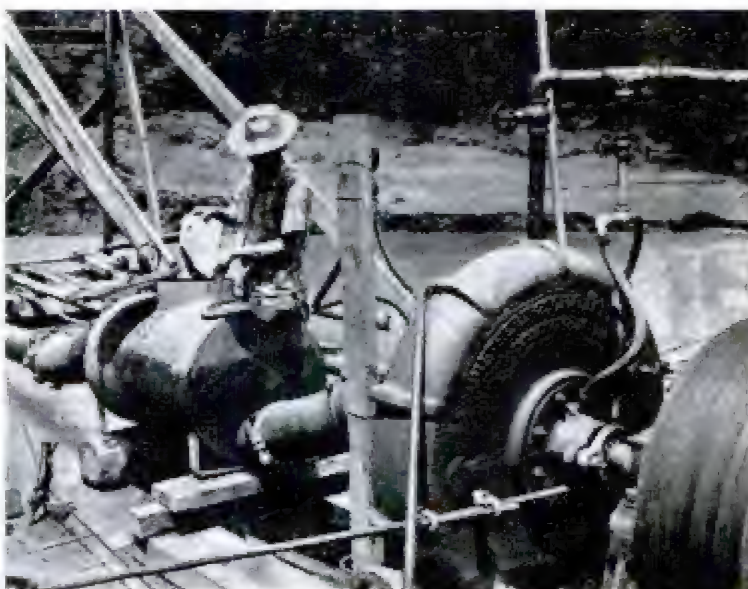
For relaxation, Professor Hutchins occasionally attaches a piece of chicken entrails to a long string leading to the shutter of his camera, which he conceals in a clump of underbrush in a remote section of some convenient woods. Illumination is provided by a flash attachment. The setup has yielded some excellent night action shots of 'possums, foxes and coons as they pounce upon the inviting food scraps.

Fighting farm foes with film has proved fascinating as well as profitable for Professor Hutchins. He has followed his unusual profession for almost two decades and is looking forward to many more exciting years of happy hunting with his camera.

Homemade Rock-Screening Tank Doubles Output of Floating Gravel Pump



Protecting the pump from damage by large rocks, a homemade rock screen doubled the pump's production by permitting the hose to work close to the gravel bed. The screen, built into a tank near the pump, eliminates the screen nozzle that reduces effective suction. Waterborne material is drawn from the pit into the top of the tank. A grille of welded bars allows gravel to pass, but holds back large rocks and roots that would damage the pump. The gravel is then sucked from the bottom of the tank through the pump to the screening plant. A gasketed cover on the tank permits the operator to remove the large rocks.



Powerful Semitrailer Vehicle Hauls Long Loads Over Rough Terrain



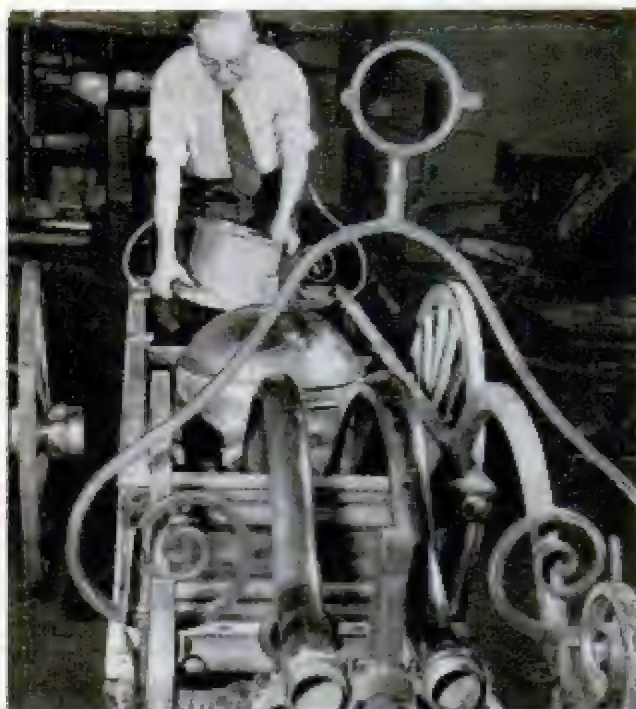
Heavy loads of great length are carried by a hauler designed to operate both in soft earth and on the highway. Pipe, timber and steel can be loaded on the hauler and carried through mud and up steep grades to the construction job. The vehicle features electric power steering and the elimination of springs and other parts under the frame which would drag when traveling through soft ground. Large, low-pressure tires prevent the vehicle from sinking into mud.



It really works! Used in the pageant at the Chicago Railroad Fair, the pumper threw a steady stream of water. In the old days the tank held water for priming the pump, which drew water from a well or river

Old-Time Pumper Rebuilt

When Carlos A. Whitney, a worker at Chicago's Museum of Science and Industry, rebuilt an ancient fire engine he first cleaned away the grime and dust of a century. Beneath it he found a tank made of inlaid wood and a name plate showing that the pumper was built in 1855. Whitney rebuilt the body, turned new brass parts for the pump and made new leather washers for the cylinders. The completed pumper, shined and ready for a fire, really throws water



Piston and other old parts had to be recut. A brass strainer prevented debris from entering the mechanism when water was pumped from a river. Below, most parts were usable, few were remade by hand



Old name plate shows that the pumper was built in 1855. Below, the inlaid body was completely refinished. Note length of pump handle used by crew members, undoubtedly proud of their inlaid wagon



Weight-Lifting Rig May Aid Paralytics

Based on the principle of weight-lifting, an exerciser for polio victims may increase the size and strength of muscles that are partially paralyzed. The weight-lifting apparatus was designed by three doctors, using funds advanced by the National Foundation for Infantile Paralysis. The limb to be exercised is placed in a harness and the patient tries to move the paralyzed muscles enough to overcome the pull of the weights. Instruments record the strength of the muscles. In experiments, more than 20 polio patients who had been making little progress under other treatments increased



the size and strength of paralyzed limbs. The exerciser is designed only for muscles which still retain some of their power.



Official U. S. Navy photo

"Sea Water" Metal Used to Make Plane

Sea and air combine in a five-seater British personal plane made of magnesium alloy, an element extracted from sea water. Though the metal weighs less than the lightest aluminum, the wings in bending tests have withstood deflection five times greater than is required. Expected to fly over 200 m.p.h., the unorthodox craft was designed by an "amateur" who had never before worked around airplanes.



Shipboard Bomber Faster and Bigger

More speed, weight and bomb-carrying capacity give the Navy's North American-built XAJ-1 an edge over present carrier planes. A turbojet engine cuts in with the two piston engines to provide added power during combat and emergencies. For easier shipboard handling, the outer wing panels fold inboard and the vertical tail folds down.



SELF-EMPTYING VACUUM CLEANER mixes the dust and dirt with water from the tap and flushes them down the drain. An accordionlike rubber hose stretches five times its original length of eight feet, giving the equivalent of 40 feet of flexible hose. A nylon screen catches hairpins, paper clips and other objects that might stop up the sink drain



BATHROOM HANGER, below left, has three grips on each of eight arms so you can hang 24 items in a small space and they won't fall to the floor. The arms swing into the plastic shell when not in use

SCREW-CAP WRENCH, center, loosens jar covers like magic. Two adjustable prongs grip the jar lid when you pull on a trigger. The long bar provides plenty of leverage for removing the tightest cover

SPRING-TYPE HANGER for trousers and skirts can be put on with one hand, right. You squeeze it and it opens, release it and it grips the garment. All metal, it will hold up to 15 pounds of clothes

WHAT'S NEW *For Your Home*





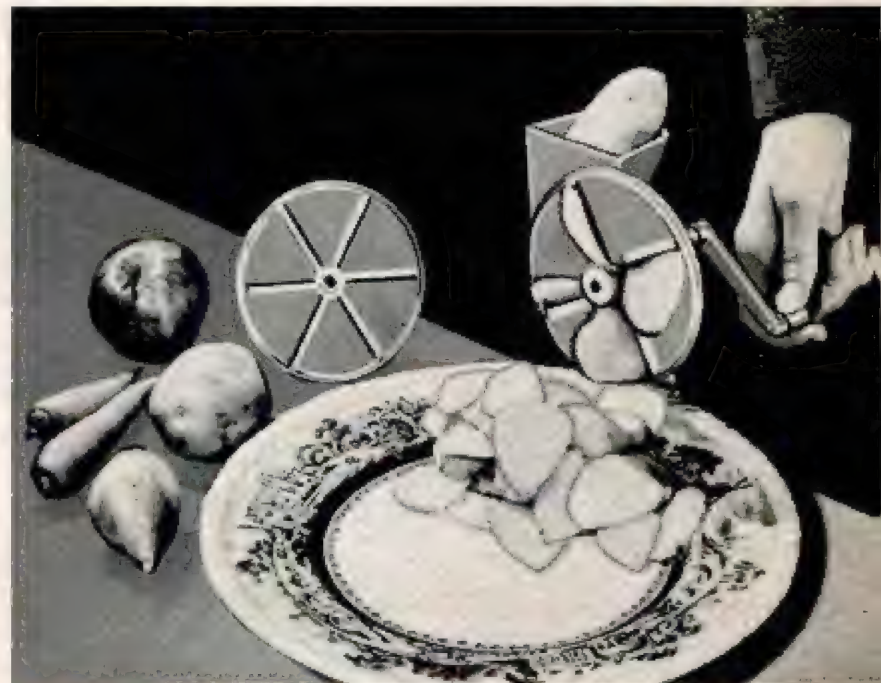
DISPENSING TRAY for bar soap keeps the soap from getting soggy. Water drains through slotted base. Press down on edge of the trap and the soap slides forward

WATERLESS RADIATOR, below, plugs into any electric outlet. Using no water or steam, it comes in two sizes. Portable, its handle swings down for use as a rack



SERVING CART has a removable tray as its top, making it convenient to pass the food around after you've wheeled it in from the kitchen. The two rear wheels pivot for easy maneuvering around furniture. Made entirely of aluminum for long life, the wagon has two fixed shelves in addition to the top tray

FOOD SHAVER speeds the preparation of salads, sandwiches, potato chips and other dishes. It uses two interchangeable blades, one for cutting the thin slices such as used in making potato chips and the other for thicker slices. Made of cast aluminum, the stainproof shaver is nickel plated for easy cleaning



No Job Is Too Large or Too Small for Japanese Brush-Writer



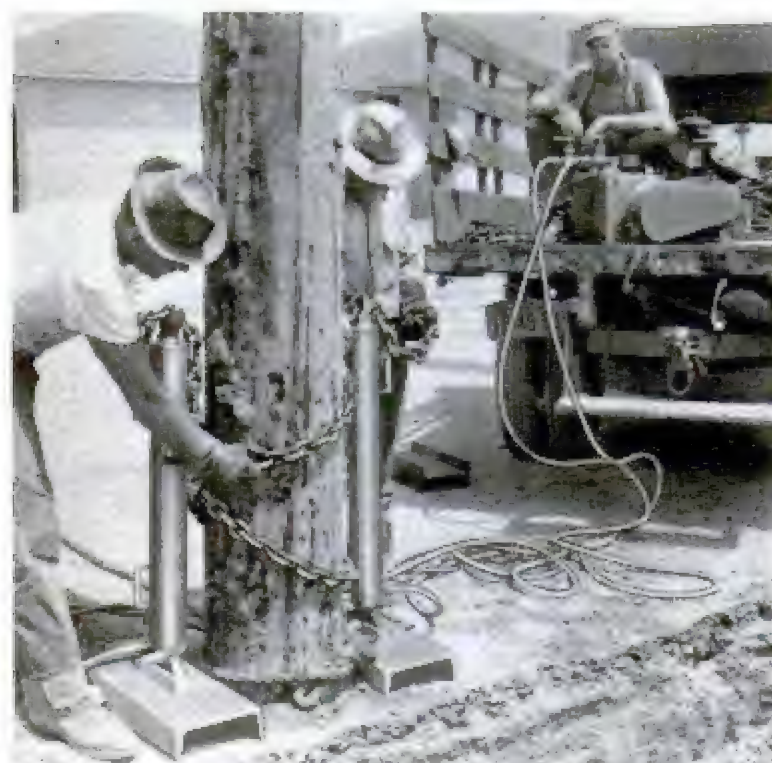
POPULAR MECHANICS



Top left, speed-writing in giant size. Right, writing brush used at left. Bottom, that's no spike! It's a common pin that shows the amount of enlargement needed to bring tiny letters up to a readable size

From one extreme to the other, Tendo Ohbayashi of Odawara, Japan, is an expert in penmanship. Using a Japanese writing brush, not a sharp-pointed pen as is generally used for microscopic writing, he prints 10,000 Japanese characters on a paper one inch square. He has printed the words *Popular Mechanics* in such tiny let-

ters that they can be read only under a strong reading glass. At the opposite extreme, he prints Japanese characters with a giant brush that weighs 50 pounds. In a recent demonstration, he printed two complicated Japanese characters, requiring five gallons of India ink, on a sheet of paper 20 by 50 feet in less than one minute.



Powerful Hydraulic Rams "Uproot" Telephone Poles

Even the largest telephone pole is pulled out of the ground in less than five minutes by a hydraulic-ram device used by a western utilities company. Two 50-ton hydraulic rams, with strokes of 22 inches, are connected to heavy chains that wrap around the pole. A small gasoline-driven compressor on the truck provides the hydraulic power. Hand-operated jacks, formerly used for this purpose, required at least two hours to raise a large telephone pole.

¶ Fifty million persons, which is 49 percent of the population of the United States over 16 years of age, are motor-vehicle drivers, according to the Automobile Manufacturers Association.



Collapsible camp is concealed in the car trunk and beneath the boat when Hardy shoves off on a fishing trip

BOAT TRAILER BECOMES CAMP TENT

Fisherman Vessie E. Hardy, Jr., of Dallas, Tex., can roam anywhere in search of good angling spots without worrying about accommodations for the night. Hardy carries a complete camp, including tent and boat, behind his car. When he wants to camp for the night he pulls a tent and two cots from the car trunk. Then he lifts the boat off the trailer, exposing a tent platform. Two extensions of the platform fold out over the trailer wheels, where they are supported by chains. Hardy converts the two boards that held the boat on the trailer into end poles for the tent, and runs a ridgepole between them. He then erects the tent and pegs it to the ground. Two camp cots fit into the tent, with four feet of space between them. Hardy can erect the camp in 15 minutes without help and repack it in the same length of time.

Top right, hinged sections of platform fold out over trailer wheels and are held with chains. Right, the poles fit into framework. Below, camp is erected in 15 minutes. It sleeps two, with space between cots





IT'S A FAR CRY from a scraggy mountainside in Vermont to the formal beauty of Washington, D.C., but without that New England peak, the nation's capital wouldn't look the same. That mountain at Danby, Vt., has provided the white marble for such beautiful buildings as the Jefferson Memorial, the Senate Office Building, the Supreme Court Building and the nearby Arlington Amphitheater.

Even the sharpest-eyed tourist would have difficulty spotting the quarry out of which so many of the nation's beautiful buildings have come. Only a ragged white scar on the forested slope marks the site. That scar, high up on the hillside, is the entrance to a vast marble mine that extends hundreds of feet inside the mountain.

Since 1840, Vermont quarrymen have been cutting giant blocks of white Danby marble and starting them on their way to fame. For the Supreme Court Building alone, more than 1000 carloads of marble were quarried at Danby.

Only one of many marble mountains in the country, the Danby mine has grown in size as blocks were removed until today the mammoth cavity covers more than 13 acres. Inside this marble hall, the temperature remains at a constant 45 degrees, winter and summer. Even on the hottest day of the year, the quarrymen wear warm jackets as they work.

Mining marble underground is about as different from mining coal as the black dust of the coal mine differs from the white dust of the quarry. Miners can get rough with coal and no

mining a marble mountain

By
Arthur R. Railton



Three Lions photo

Channeler cuts deep grooves in the quarry floor as it runs back and forth on its track. It works like an air hammer. Photo on opposite page shows a quarry, looking toward the entrance. Ledges on the pillars were left when layers of marble were removed. The pillars support the roof of the quarry



Above, quarrymen pound wedges into holes in the marble to loosen the layer of waste rock on top. Left, big block of marble leaves quarry on its way to the mill

damage is done, but marble has to be treated gently. Sudden shocks must be avoided. Blasting is never done in marble, although it is frequently used to clear away the waste rock around the deposit. Whenever blasting is done in the waste rock (the quarrymen call it country rock), an insulating channel is cut between the rock and the marble to prevent the blast from spreading and shattering the fine stone.

At the Danby quarry, the marble deposit comes almost to the surface on one side of the slope and then travels horizontally into the hill. It was much easier and more economical to tunnel into the rock above the marble deposit than to remove about 200 feet of waste-rock overlay to uncover the valuable stone.

This tunnel has grown until

Marble can be worked like wood or metal. Below, workman is turning a column on a lathe. A stream of water cools the tool



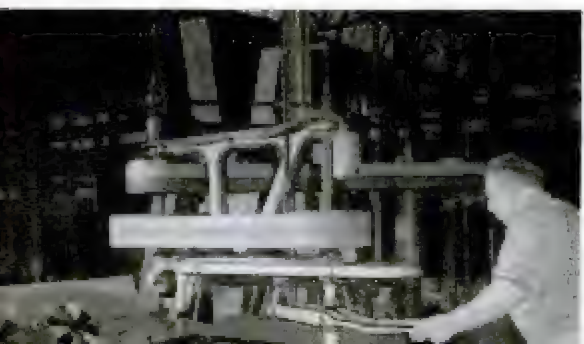


the quarrymen are now working more than 700 feet in the heart of the mountain. The underground mine is more than 700 feet square and more than 90 feet high. At regular intervals inside the quarry, thick pillars of marble are left to support the top of the mountain, else the mountain might cave in the quarry roof. The pillars are from 20 to 30 feet square at the base and about 75 feet apart. This marble is, of course, wasted and can never be removed safely.

In a project such as the Supreme Court Building, the exact location of each block in the building is known before any cutting in the quarry begins. The quarryman has to know the exact size of the piece before he can lay out the block for the channeling machines.

These channeling machines, operated by air pressure they produce themselves with an electric motor and compressor, cut long crevices in the marble floor.

Mirrorlike finishes are put on marble with this machine. The various polishing heads are shown at extreme left of photo



Marble blocks are carried down into the valley, 900 feet below Danby quarry, on this cable car. The track is almost a mile long

In the finishing mill, the marble is rubbed down to the exact size on huge cast-iron wheels. Sand and water are the abrasives





They run on steel tracks like pint-size locomotives moving back and forth, their chisel blades pounding into the marble. There are five different blades in each chisel and they pulverize the marble with a pile-driver action of 300 strokes a minute. The machines weigh more than four tons each and can cut a channel to a depth of 20 feet. Water is added, as the cut deepens, to keep the marble chips in suspension. At intervals during the cutting, the machine operator bails out the crevicolike cut with a slender scoop.

After the longitudinal channels have been cut, the operator moves the track for the crosscuts which divide the long strips into blocks of the desired sizes. When the cutting is completed, the quarry floor looks like a giant checkerboard with cuts running at right angles to each other.

Removing the key block (the first block in each level) is the step that "unlocks" the floor so the other pieces can be removed easily. A powerful derrick pulls on the block as one side is wedged or pried until the block breaks free at the bottom. After this operation, the quarrymen can work at the lower level, cutting the bottoms of the blocks with pneumatic drills and wedges.

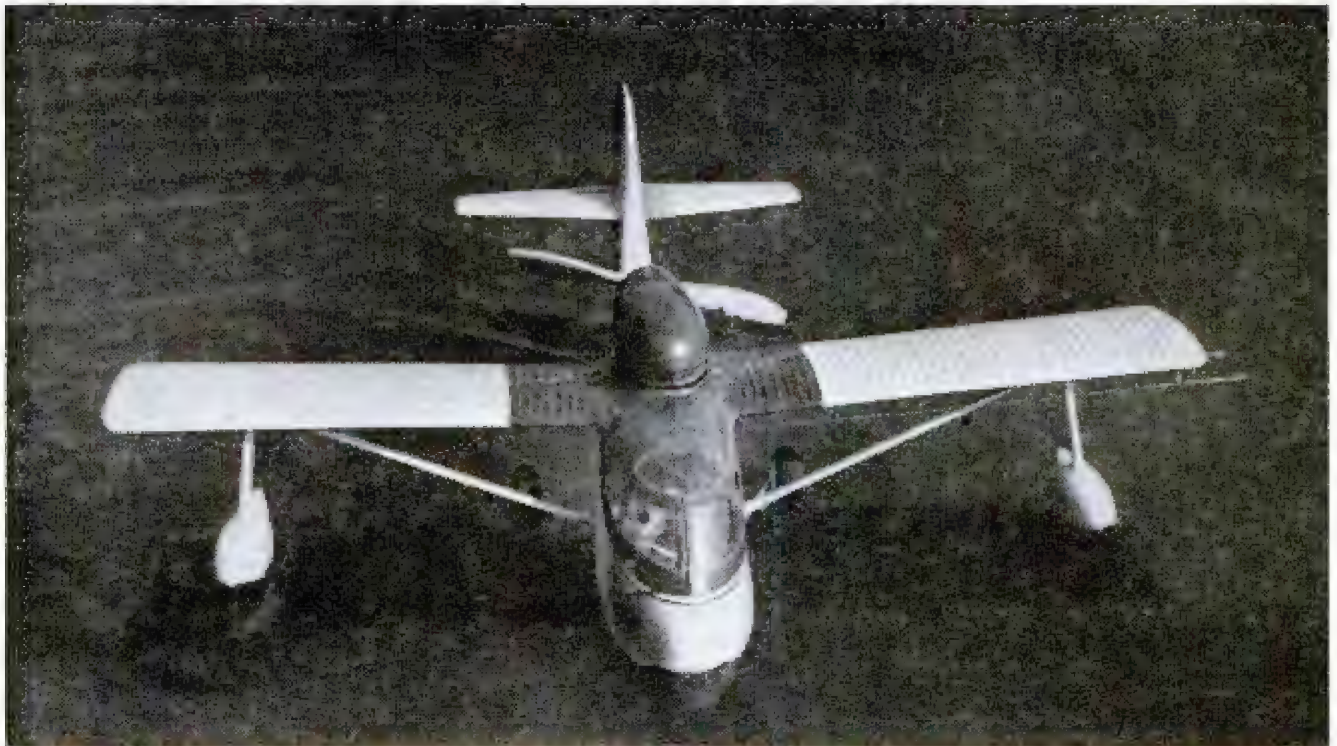
The shape of each block is carefully marked in the marble and the cuts follow this marking exactly so that the block will

(Continued to page 258)



Top, diamond-toothed saw cuts the base of a marble urn. Center, carving a soldier memorial from solid block of marble. Plaster model is at left. Lower right, artisan uses pneumatic chisel to cut design of 25-foot White Chapel Memorial shown at the left





Molded Parts for Model Planes Give Accuracy With Strength

Skin parts molded of cloth and paper give model-airplane builders a perfection in scale that is impossible to attain except by professional modelmakers. The contour parts are laminated into a thin, rigid skin by combining paper and cloth under heat and pressure. The resulting parts are exact replicas of corresponding parts in the real plane, and are much stronger than wood frames covered with paper. The assembly time of the kit is reduced. Waterproof and highly resistant to fuel and oil, the pre-formed parts withstand crack-ups that would demolish other model planes.



Top, model of Republic Seabee shows the accuracy of detail possible with the molded skin parts. Above, plane assembled by gluing preformed parts to frame



Oil-Level Gauge Is Easy to Read

Oil-storage tanks need never run dry when a gauge which tells the oil level at a glance is used. All the visible parts of the gauge are made of plastics. The indicator is mounted on top of the tank through a steel coupling and can be read from all directions. The gauge withstands a filling pressure of more than 70 pounds per square inch.

There are approximately 9000 airplanes used by United States farmers now as compared with only about 100 in 1941.



This 900-pound baby steer is a preview of the "streamlined" model that will provide you with choice cuts of meat in a few years. Note its square lines, low frame and short "wheelbase"



Compare this new-model Poland China pig with the scrawny hogs on the opposite page. Below, sheep at left, much bigger than pure Navajo at right, is a crossbreed of a Romney and Navajo



Nature needs help as a hungry world calls for food. "Blueprints" drawn up by animal engineers promise to give us more meals from each animal

..... Engineering

PLANs for the 1950-model beef critter already are on the drawing boards of the nation's animal engineers—and never did you see such a streamlined creation!

Built with square lines, low to the ground and with shorter "wheelbase," this advanced model will carry more T-bones and tenderloins for its weight than any animal yet to appear on American ranges.

The animal engineers have other new designs on the drafting board for release soon — specifications for ultra-efficient pigs, sheep, chickens and turkeys. Here are some of the new models:

An air-conditioned cow for hot climates.

Beautified sheep, without ugly neck wrinkles and dental defects.

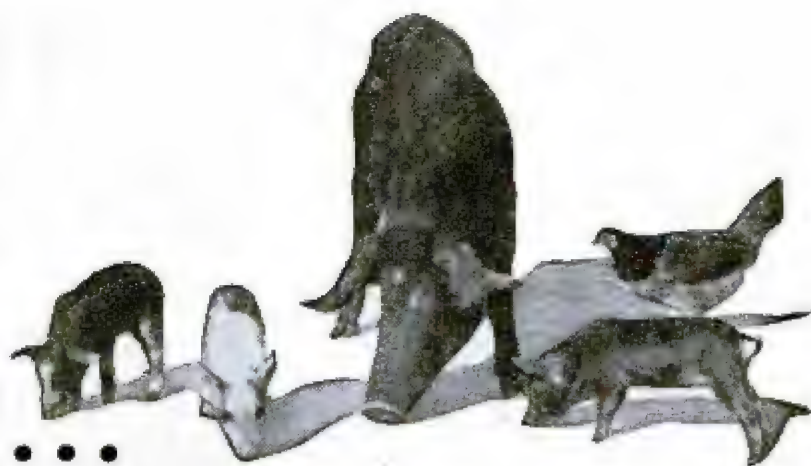
Streamlined hogs with more pork chops, fewer spareribs.

Hens that lay firmer, better, poaching eggs—and more plentifully.

"Early bird" turkeys that beat the season to be ready for the roaster before Thanksgiving.

Home-grown sheep clothed in valuable Karakul coats.

"Piney woods roaster" with three little pigs that will grow into razorback hogs just as thin and scrawny as their mother. Animal engineers are developing more efficient breeds of swine to provide better meat for you



Better Meat

By Maxwell Reid Grant

And if 1950's steaks are juicier and more tender, you can thank such inventive geniuses as those who invented a mechanical chewing device to set new standards for meat quality. Don't laugh—a scientist *has* to be exact—and two government research men, testing meat in a project aimed at improving beef quality, needed an accurate way of rating the tenderness of steaks and roasts.

Their first effort was a set of jaws with teeth to imitate actual chewing. This didn't work too well, so they evolved a mechanical "biter" which cuts out a circular core sample much as a cook cores an apple. This tidbit of meat is put into a triangular hole in a large steel blade. A motor, pulling against a strong spring, draws the blade through the sample, just as a carpenter pulls a saw through a piece of wood in a

Veterinaries of the Department of Agriculture risk their lives while working with sleeping-sickness virus. This protective clothing reduces the risk of infection as they prepare a vaccine against the dread disease





Scale, held against a photomicrograph of fleece that is magnified 500 times, shows quality of wool hairs

miter box. As the meat is sheared in two, its tenderness is read on a scale.

Tender steaks are only one of the things the animal engineers are demanding of the improved beef critter. They also expect top performance—sturdy animals that are healthy, fast-growing and don't eat their heads off. By sea and air, animals from many parts of the world are being brought

to U. S. laboratories so their good qualities can be drafted for American agriculture.

For instance, there's the air-conditioned cow. Two years ago a ship docked at an eastern port, bringing two young bulls and two heifers on the last lap of a 12,000-mile sea-and-air journey from India. Government scientists, combing the earth's dairy population, had selected these animals for their ability to withstand hot weather.

Cows have no sweat glands—they keep cool by breathing hard and evaporating moisture from their lungs. In humid summers of the southern states, ordinary cows such as Guernseys and Jerseys pant listlessly and milk production falls off as much as 40 percent. But the Indian cows have loose skins with more cooling surface and their thick, hairy hides are good insulators. Their weakness is stingy milk production—only about 2000 pounds of milk yearly compared with a U. S. average of 4500 pounds.

Now the animal designers are well along toward combining the good qualities of the two types to get an air-conditioned cow that faces southern summers without a murmur, yet yields milk plentifully. It can mean new prosperity to southern farmers.

Another "model" is being air-conditioned by crossing the Aberdeen Angus cow with the Afrikaner, which is similar to the humpbacked zebu and whose tropical an-

Eggshells are tested for strength and porosity and only those of top quality are placed in the incubator

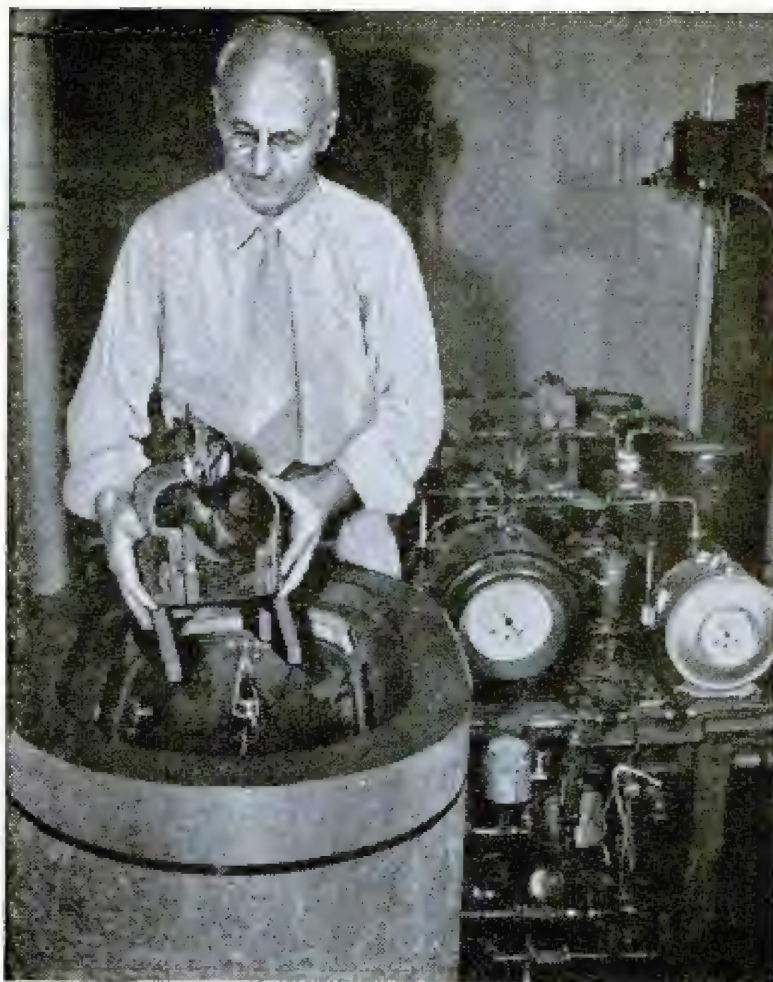


cestry promises to assure hot-weather efficiency.

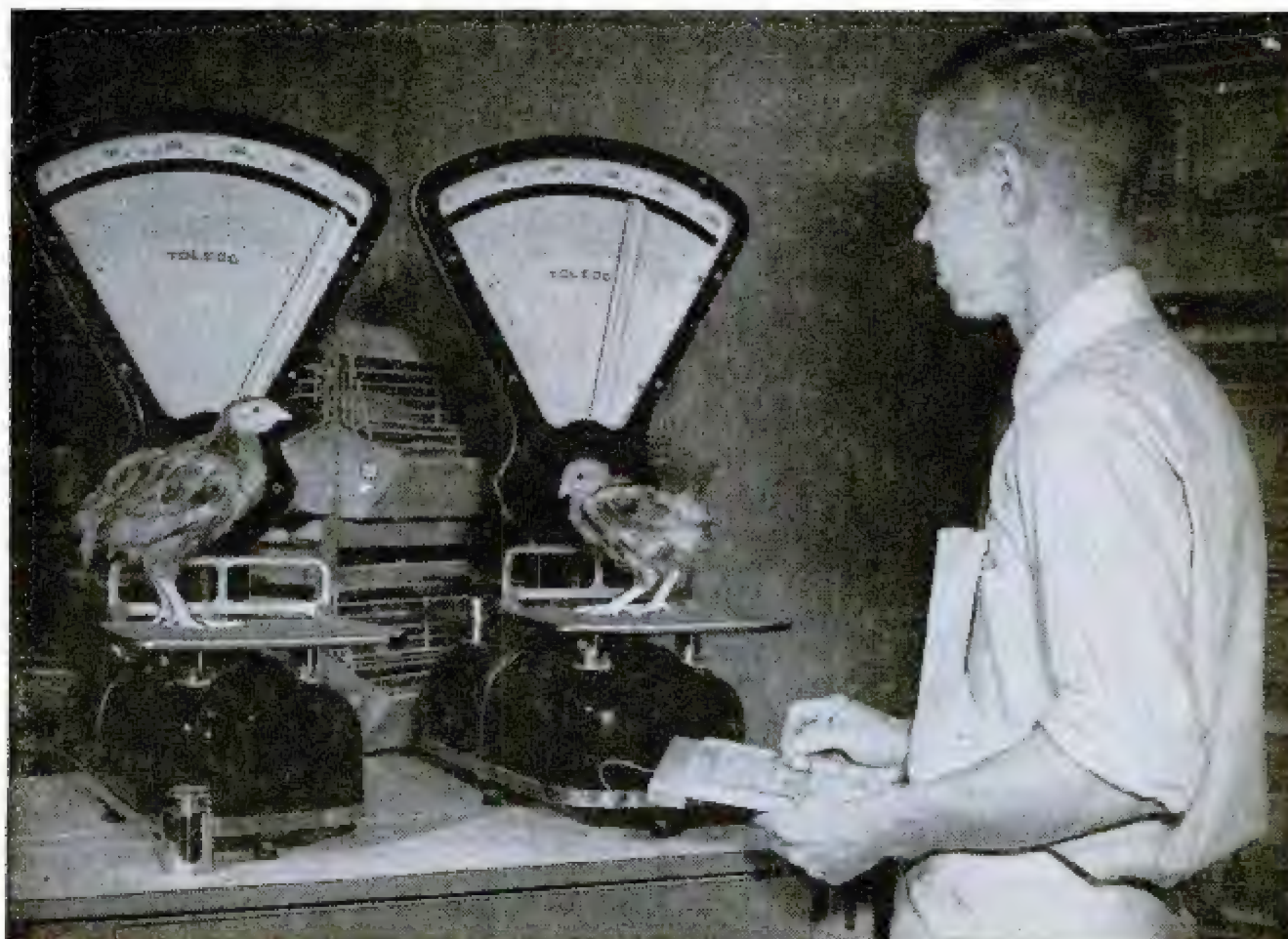
Face lifting for sheep is a typical job by which the animal designers want to correct nature's mistakes, paving the way for production-line efficiency. Not that they are worried particularly about Mrs. Sheep's glamour—they want to do away with skin wrinkles that make shearing difficult and lower the value of the fleece. Too much wool about the eyes nearly blinds some sheep, so they can't even follow the leader—thus a relatively barefaced sheep is worth more. Occasionally, too, sheep have overshot jaws so that the front teeth don't meet, making chewing so difficult that the animal actually is underfed. These defects are avoided by not using such animals in breeding flocks. Research men at the Western Sheep Breeding Laboratory in Idaho already have cut down skin wrinkling of Rambouillet sheep and many lambs raised there are born free of the troublesome skin folds.

The animal engineer uses three main tools: (1) "selection," or picking out superior animals to be

(Continued to page 246)



Hen being placed in test chamber will have her efficiency determined by measuring the intake of oxygen and output of heat and carbon dioxide. Below, weighing chicks that were fed same diet except one on left received a concentrate of cow manure



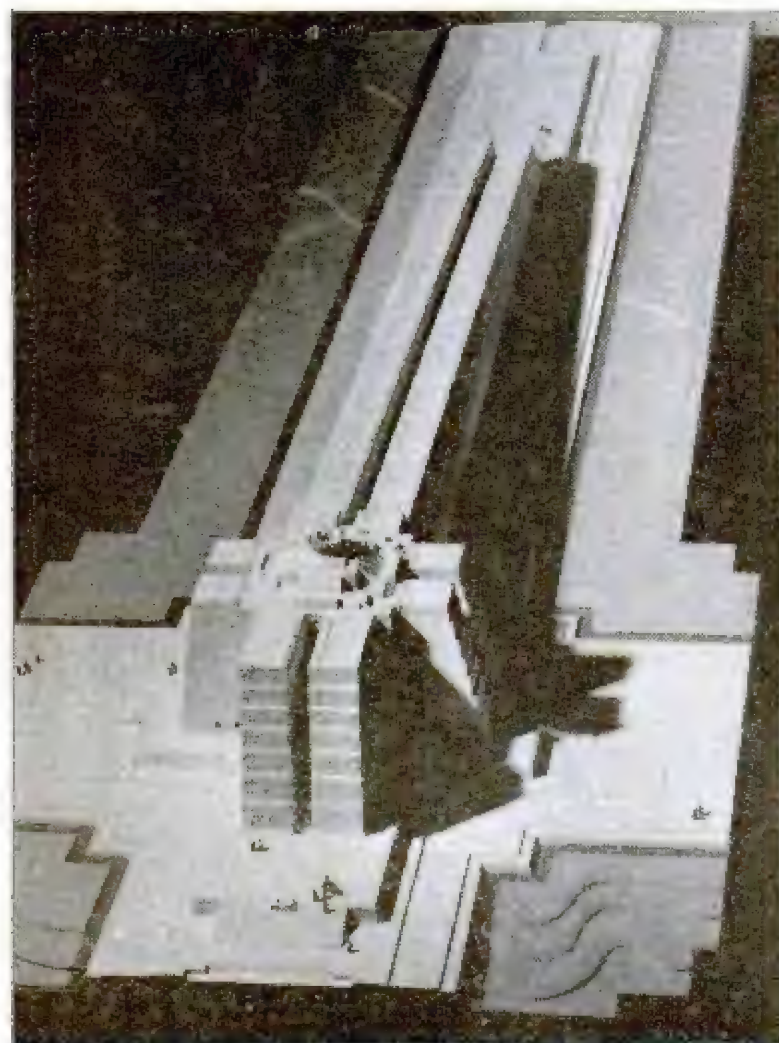


Scooter Scoots 75 Miles Per Gallon

Two passengers or a payload of 400 pounds are carried by a four-wheel vehicle that scoots along at speeds up to 30 miles an hour. The 160-pound vehicle travels 75 miles on a gallon of gas. A $2\frac{1}{2}$ -horsepower engine delivers thrust to only one of the wheels. The brake, clutch and shift lever have been replaced by a control stick. The lever operates a torque converter consisting of a drive unit for a bomber turret, providing a variable gear ratio. The driver pushes the stick forward



to move ahead and pulls on it to back up or brake. On the floorboard are a foot throttle and emergency brake. Oak slats that form the floor give the vehicle a spring action that eliminates the need for springs. The scooter is being used by disabled veterans, and guests at several resorts.



Memorial for Columbus To Be Giant Lighthouse

Ground recently was broken in a ceremony that marked the beginning of construction of a massive lighthouse memorial to Christopher Columbus on the south coast of the Dominican Republic. When completed, the memorial will form a recumbent cross measuring three quarters of a mile from end to end and 120 feet high. A powerful beacon at the junction of the crossarms will project a vertical beam to guide aircraft as well as ships. The body of Columbus will be moved to the memorial and 21 American nations will provide material for a museum and library. The memorial lighthouse will cost \$5,000,000. A large part of the money will be raised by special stamp issues of the 21 nations comprising the Pan American Union.

☛ A single 277-ton power generator, completed recently by Westinghouse, will turn out the equivalent of 134,000 horsepower—as much as produced by 20 of the largest railroad locomotives.

Electric Paint Remover Does Not Char Wood

Paint and putty are removed from buildings and windows safely with a small, electric tool that develops 1000 degrees of heat and has four scraping edges. The wood is not charred by the tool which blisters the paint, making it possible to scrape it away quickly and without danger. Its four edges can be sharpened when dulled by long use and are easily replaced when worn out. The tool operates on standard house current at a cost of about three cents an hour.

Right, there's no danger of setting your house on fire when you get rid of the old paint with an electrically heated scraper



Motorcar for Handicapped Operates Like Plane

Many of the control features of an airplane have been built into a motor vehicle designed for handicapped veterans. Constructed by Edward T. Adkins of Palo Alto, Calif., the little car runs three miles an hour on electricity supplied by a self-charging battery or 20 miles an hour on a gasoline engine. The tires are from the tail wheels of fighter planes and the controls for operating the vehicle are grouped just as they are in multi-engine planes. A built-in spray for extinguishing fires operates automatically.

Spotting Scope For Marksmen

Banging the eyepiece with shooting glasses is unnecessary with a new 60-mm. spotting scope that gives a brilliant image from an eye distance of nearly one inch. This also eliminates squinting and makes target spotting quicker and easier for the marksman. The 20-power scope has coarse and fine focusing adjustments. It is about 14 inches long and fits any shooting kit. Lens caps screw over the eyepiece and objective, eliminating the need for a special case.





Coach Beams Instructions to Players By Short-Wave Radio

Coaches can instruct players by short wave with a miniature transmitter and receiver that has a headset about the size of a hearing aid. One of the tiny broadcasting stations has been assigned an FCC license and was used by coach Mercer Beasley at the Forest Hills tennis courts. The coach speaks into a microphone and his words are

picked up by an antenna in a belt worn by the player. Attached to the belt is a small box which holds the batteries for the transformer. Beasley conceived the idea for the coaching aid and Charles Lundgren, a sports enthusiast, developed the equipment. The men say that it can also be used to coach other sports.



Suits Travel Without Wrinkling In Automobile Garment Bag

Three suits are held without wrinkling in a waterproof garment bag designed for use in automobiles. Made of plastic-coated fabric, the bag has a full-length slide fastener. The material is said to be long-lasting because weather and rough treatment will not harm it.

Secret Chemicals of Head-Hunters May Aid Fight Against Cancer

Secret chemicals, said to have been used by the head-hunting tribes of South America, may provide a weapon in the fight against cancer. Because cancer is a condition in which the cellular tissue multiplies rapidly, the chemicals, used by the savages to shrink the heads of their victims, are thought by Dr. Wilburn H. Ferguson of Ecuador to be a means of returning the cells to normalcy. The chemicals are held in secrecy by the tribes and it was only after years of friendship that Ferguson was given a small jarful of the formula.



BUILD YOUR OWN FURNITURE

The CRAFTSMAN

★ In answer to many requests for good furniture design, the Craftsman editors feel especially proud in presenting the beautiful modern bedroom suite pictured in full color on page 190. Designed and constructed exclusively for Popular Mechanics, it was built in a home workshop with the tools pictured in the story to prove that it can be duplicated easily by the average craftsman. Patterned after the popular functional style, the group features a novel bed which incorporates storage space in the headboard. A special feature of the design is the inset or "hopper" front which gives a pleasing shadow line. Stock plywood reduces cost.

★ Ordinarily, craftsmen think of a bandsaw only as a tool designed primarily for making outside curved cuts in stock of varying thicknesses. But, properly set up and fitted with simple fixtures, this common shop tool can handle a wide variety of work difficult to do by any other means. A comprehensive shop article on page 230 explains in detail how to run a bandsaw.

★ An excellent two-man boat for fishing small lakes, this little plywood job is light enough to be transported on a car-top luggage carrier. Its construction, described on page 202, is simplicity itself, requiring no complicated patterns to be followed.

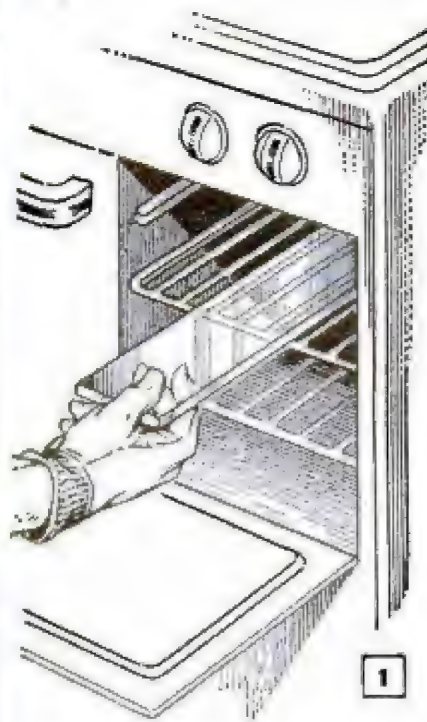
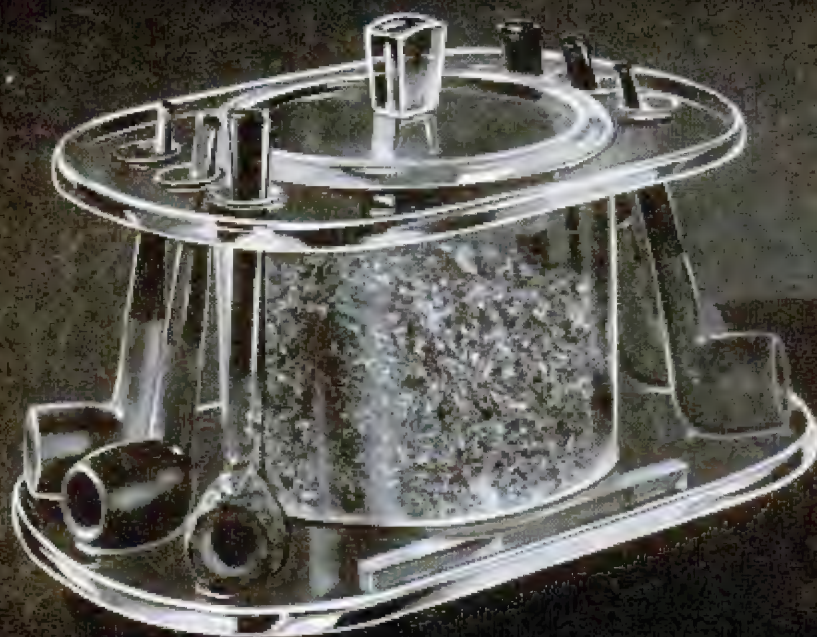


HOW TO RUN A BANDSAW

11½-FT. PLYWOOD ROWBOAT



humidor-and-pipe rack



The plastic is made pliable by placing it in an oven set at 250 deg. F. When pliable, the plastic is handled carefully with gloves

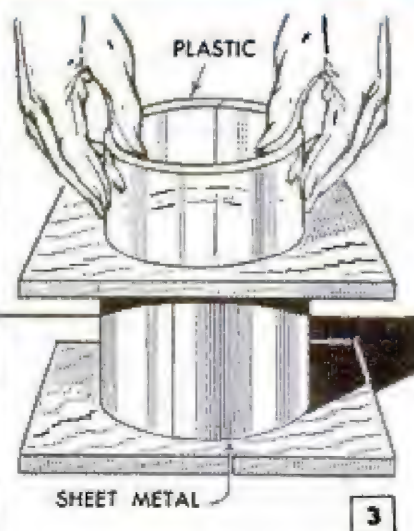
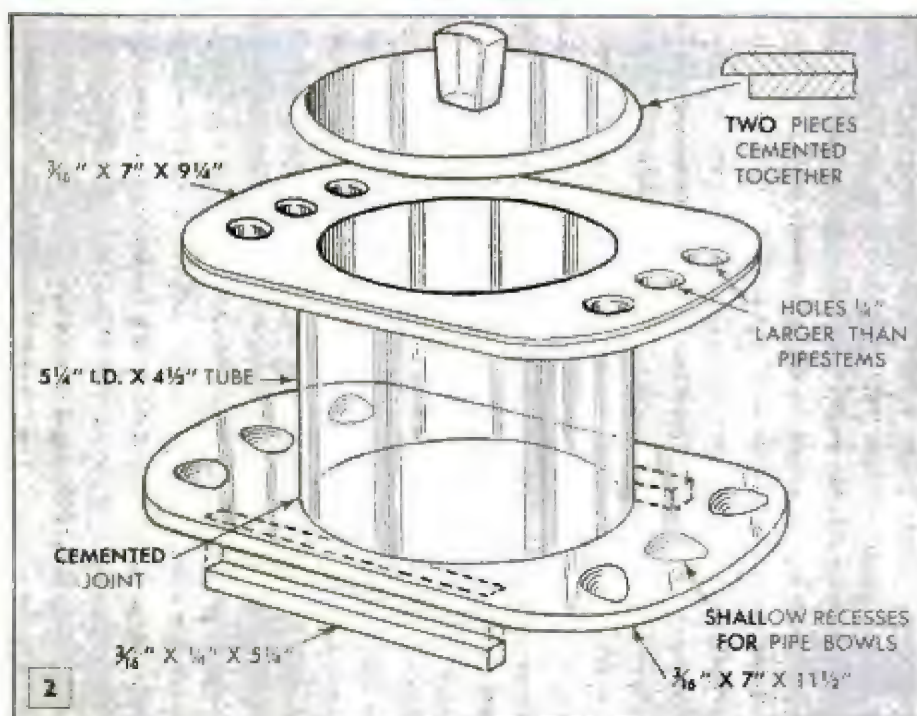
Humidor-and-pipe rack: The humidor, Fig. 2, is a cylinder formed from a sheet of heat-forming crystal plastic, $\frac{3}{16} \times 4\frac{1}{2} \times 13\frac{1}{4}$ in. Forming is done by heating the sheet until it is pliable, Fig. 1, and then rolling and placing it in a forming jig to cool. The jig consists of a piece of sheet metal held in cylindrical form by two pieces of plywood cut out to slip over each end, Fig. 3. When the plastic has cooled, it is removed from the jig, the two

By R. Barsamian

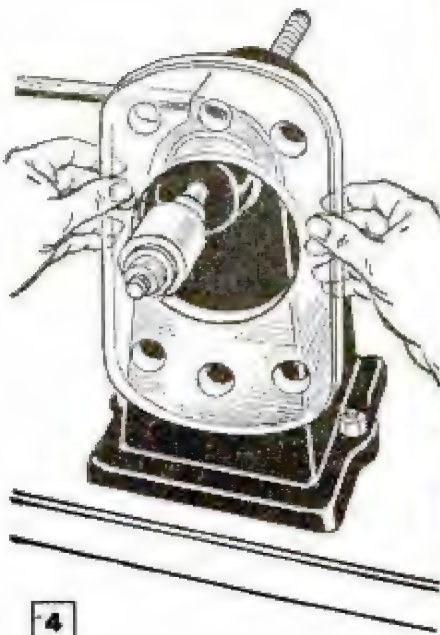
PROJECTS

ends are coated with cement (ethylene dichloride) and held together a few moments until the cement sets. Then the plastic is again placed in the jig and wrapped with cord until thoroughly hardened.

The cylinder is cemented between two flat pieces of plastic. The top one is drilled for pipestems and an opening is turned in its center to suit the



The pliable plastic is rolled to a cylindrical shape and placed in a sheet-metal mold to cool. As it cools, the plastic sheet will expand and conform to mold



4

Internal edges of the plastic are polished with a felt spindle-type buffer attached to polishing head. The buffer is charged with rouge.

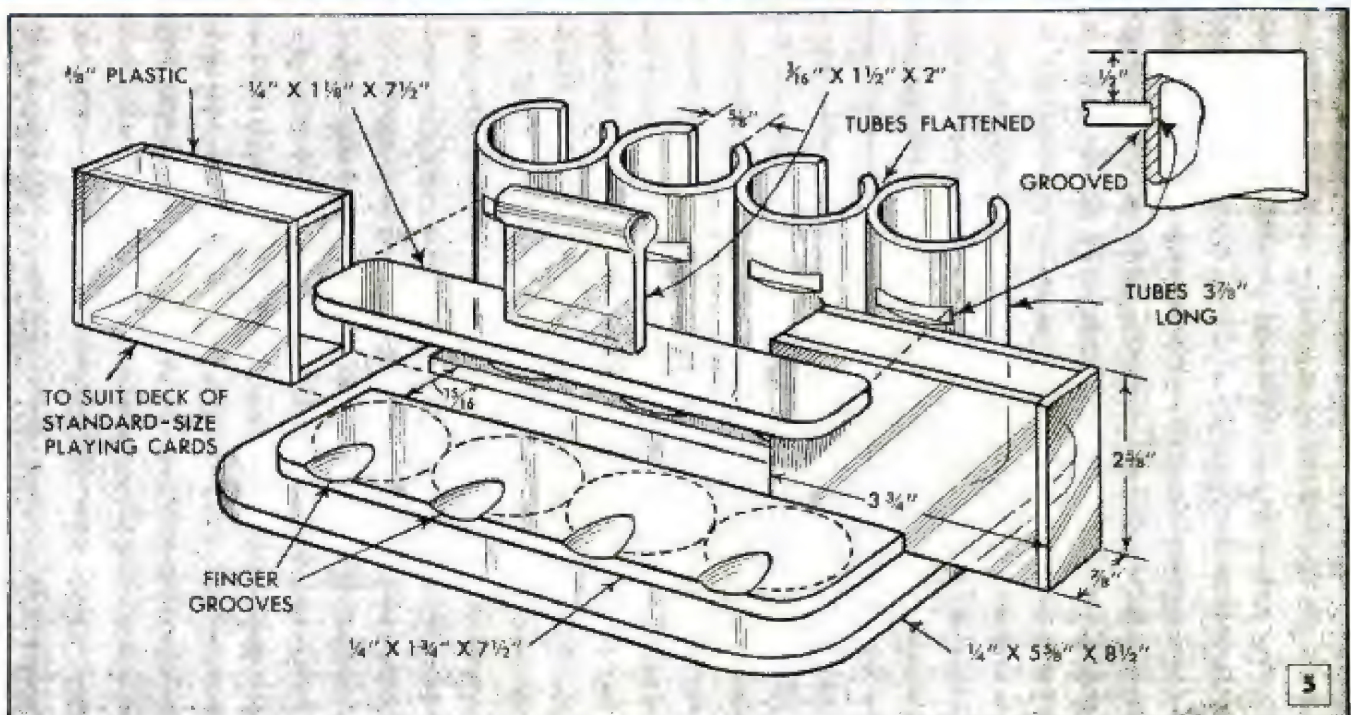


in PLASTIC

inside diameter of the humidifier cylinder. The edges of the holes are polished as in Fig. 4, and shallow depressions for the pipe bowls are formed and polished in the top surface of the bottom piece with a hand grinder. Two strips are cemented to the bottom of the base to provide feet.

Chip-and-card holder: Wells for the chips are cut from standard tubular stock

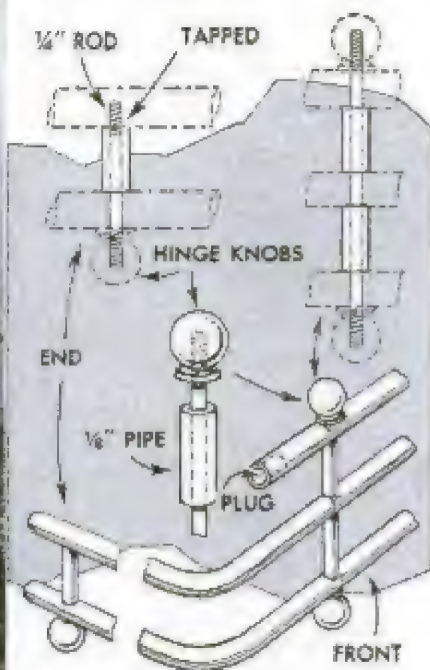
of the proper size. A groove is cut across the back of each tube near the top to receive the handle, and a finger slot is cut in the front of each tube. The wells are cemented to two separate pieces which are spaced apart and, in turn, cemented to a base piece to form a track for two playing-card containers. Note, Fig. 5, that shallow depressions are first filed in the edges of these pieces under the chip wells. These provide finger grips for removing the chips.



3

W1 m-91

Fireplace Rails of Polished Brass Pipe Are Assembled With Door-Hinge Parts



One homeowner added a decorative touch to the hearth of his fireplace by setting these modernistic brass rails in front of the andirons. The rails, cut and bent from lengths of $\frac{1}{2}$ -in. brass pipe, are held together with several ball tips taken from loose-pin door hinges. Spacers of $\frac{1}{8}$ -in. brass pipe are placed between the rails and the tips, after being tapped, are screwed onto the threaded ends of $\frac{1}{4}$ -in. rod. To give the appearance of rod stock, the open ends of the short top rail are plugged with pieces of brass stock, pressed in place and filed flush. All parts are buffed and lacquered. — Carl J. Terjung, Brooklyn, N. Y.

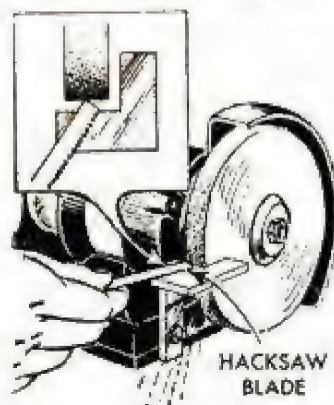
Wooden Coat Hanger Provides Short Rails for Workbench or Table Top

Arms of a wooden coat hanger are already shaped to provide short rails for the top of a workbench or table. It's just a matter of cutting them from the hanger, as shown, and fastening them in place. A wooden backing strip should be nailed to the edge of the bench top before attaching the rails. — Roland Cueva, New York City.



Improved Grinding-Wheel Dresser From Old Hacksaw Blade

If a wheel dresser is not available, a grinding wheel can be trued with a discarded hacksaw blade. First set the tool rest about $\frac{3}{4}$ in. from the wheel. Then lay the saw blade flat on the rest and at a 45-deg. angle to the edge of the wheel. Holding the blade firmly, feed it slowly back and forth with light pressure. After a little experimenting to find the proper technique, the wheel can be dressed quickly. — C. R. Van Druff, McLouth, Kans.



Glue spots can be removed from fabric by soaking the spots with hot water and soap and then wiping dry with a clean cloth. Repeat this operation as often as necessary to remove the glue spot from the fabric.

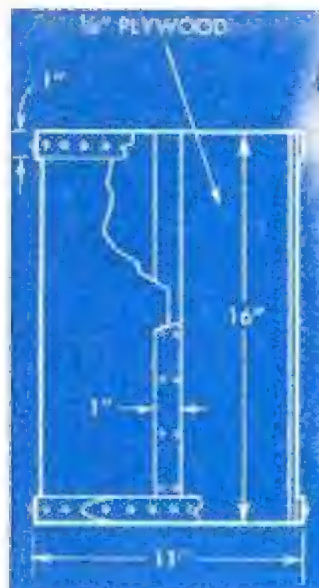
Power Handsaw Run Through Joint Aids Fitting Plywood Panels

Rather than take the time to plane the edges of plywood panels before abutting them, I obtain a perfectly matched joint in just a few minutes by laying the panels edge-to-edge on a flat surface and running a power handsaw through the joint. The panels, of course, must be temporarily tacked in place. A straightedge tacked to one of the panels is used as a saw guide.

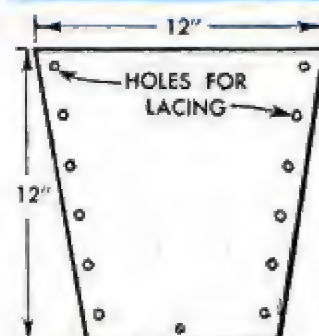
C. E. Barker, Calgary, Alta., Can.

WASTEBASKETS

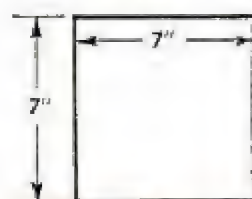
This basket was made from thin plywood salvaged from a shipping carton, although hardboard can be used. The bottom consists of a 10½-in. disk of ¾-in. wood around which the plywood is wrapped and fastened with small nails. The abutting edges of the plywood at the seam are faced on both sides with a plywood batten and nailed with escutcheon pins. Then the rim and bottom edge of the basket are covered with plywood hoops which are held with roundheaded gimp nails. The exposed ends of the hoops are tapered and lap about 4 in. The gimp nails at the top are clinched on the inside. Two strap handles complete the basket.



The utter simplicity of this five-piece basket will appeal to the beginner having few tools. The sides, being exactly alike, can all be sawed and drilled at one time from either plywood or hardboard. The edges are beveled 45 deg., and the bottom of the basket is a square piece of ¾-in. solid wood. Other than the screws which are used to attach the sides to the bottom, no metal fastenings are used, as the corners are laced together with a ¼-in. leather thong or a shoelace. Lacing is done in a manner similar to lacing a shoe, starting at the bottom and ending at the top with a knot on the inside.



SIDE, 4 REQD.



¾" BOTTOM



Consisting of eight tapered staves screwed to a solid-wood bottom and laced together at the top, this basket is somewhat more difficult to make than the one described above. Here the edges of each stave are beveled 22 deg. to produce mitered joints when the staves are assembled. The edges can be sawed on an angle if a power saw is available, but if the beveling must be done by hand, the staves are cut out and then beveled with a plane. With the latter method, uniformity of the bevel can be assured by using a jig to support the stave at the proper angle and the plane horizontally. Sash cord or clothesline is used to lace the staves. The ends can be knotted on the inside or tied in a bow on outside. Finish all parts before assembling.



STAVE, 8 REQD.



5" BOTTOM





GILT PICTURE FRAMES are cleaned easily with a brush dipped in a mild solution of washing soda. After the frame has dried, brush it thoroughly with clean water

SOLVING

STEAMING WALLPAPER to remove it from a hall or other small room can be done quickly with your household iron, especially when so small a job does not justify renting a steamer. Dampen a cloth and fold it into a pad. Then hold the iron against the pad to steam the paper loose. Keep wetting the pad



HATS, CAPS AND GLOVES will take less space in crowded clothes closet when they are hung on a wire strung above the clothes pole. Spring clothespins are threaded on the wire which is attached to screw eyes

LENGTHS OF LIGHTWEIGHT CHAIN held across the front of a bookcase with snap fasteners, left, prevent small children from taking books from the shelves

WINDOW-SHADE WEAR due to the irregular tracking of the shade when raised or lowered, is eliminated by attaching two auto-window antirattlers at the top of the shade roller and near its ends, below





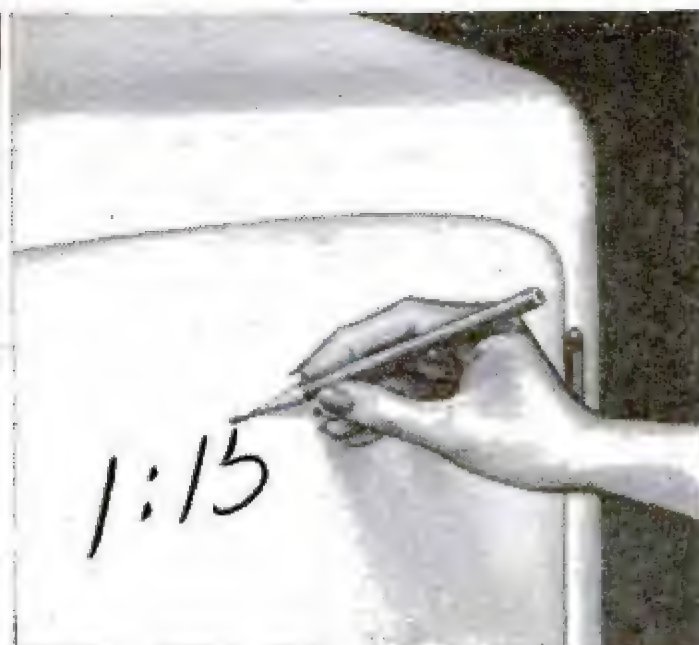
SQUEEZING A LEMON through cheesecloth is an easy way to obtain a small quantity of strained juice. The cloth is moistened with water so it will not absorb the fruit juice and then fastened over the end of the lemon with a rubber band



YARN FROM OLD SWEATERS or dresses can be reused if the kinks are removed by steaming over a pan of water. To do this, slip three clothespins over the rim of the pan and wind the yarn around them. It takes only a few minutes of steaming to straighten the yarn for reuse

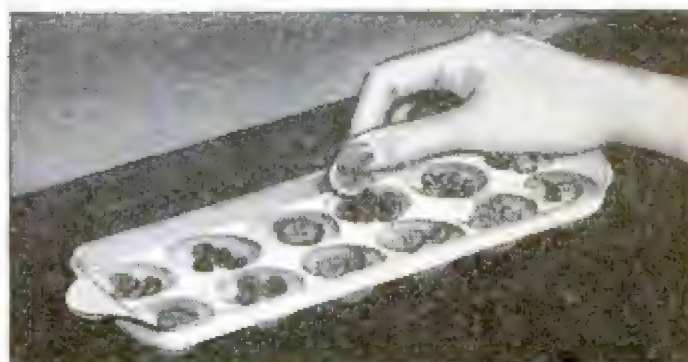
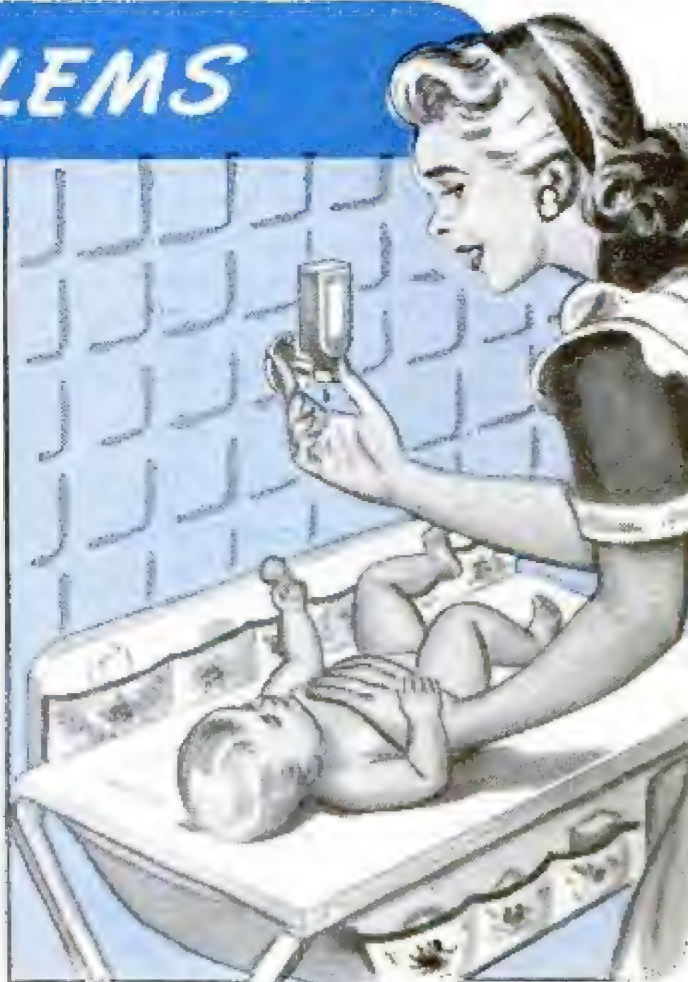
HOME PROBLEMS

HAND-LOTION DISPENSER fastened to the wall above a bathinette provides a convenient dispenser for baby oil, right. With the oil bottle turned into the dispenser, the oil can be obtained with one hand while baby is held with the other



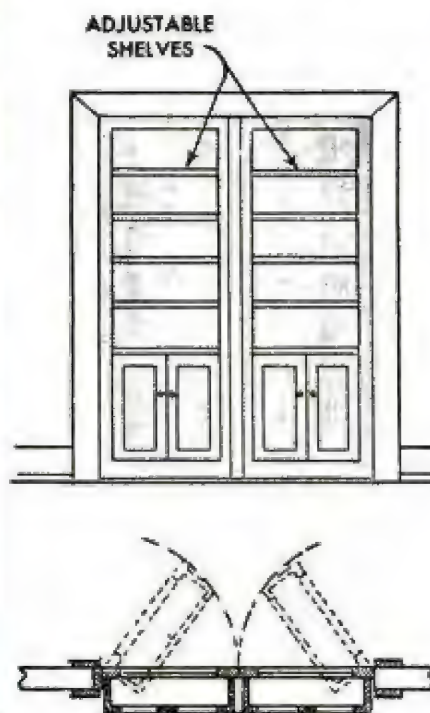
IF SHERBET OR ICE CREAM must be removed from the refrigerator at a definite time, write the hour on the refrigerator door with a grease pencil, above. Then, when in the kitchen, you are sure to notice the reminder. Marking is wiped off

STORING BUTTONS in a plastic egg container keeps them separated and makes selection easy. The depressions which hold the eggs in the container are about 1 in. deep and provide space for storing twelve types and colors of buttons



Furniture You Can Build p. 123

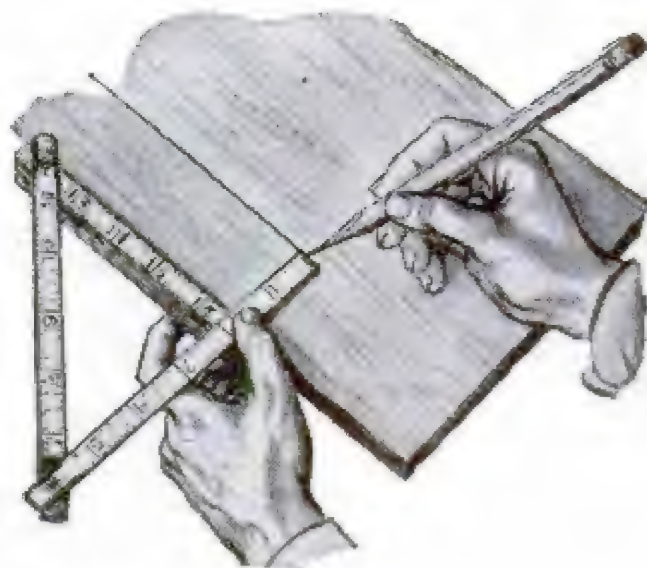
Doors Between Living and Dining Rooms Fitted With Modern Swinging Bookcases



Our home is one of the older types which originally had large sliding doors between the dining and living rooms. To avoid a major remodeling job, we hit upon the idea of modernizing the opening by fitting it with two doors in the form of bookcases. Viewed from the living room, the doors appear to be a built-in bookcase. A large mural on the dining-room side adds an unusual decorative treatment to that room. Three heavy hinges fasten each door to the jamb. Note that space is allowed between abutting edges of the doors to permit them to close. A facing strip nailed to one of the doors covers the gap.—Nan Thomas Issett, Burlington, Vt.

Adjustable Marking Gauge

A standard zigzag rule doubles as a convenient marking gauge with sufficient accuracy for most work around the home. It is readily adjusted to the desired dimension and the folded portion serves as a guide along the edge of the work.

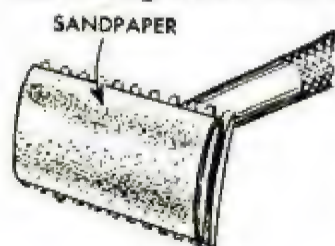


Safe Way to Carry Hunting Knife

Always carry a hunting knife in a sheath strapped over a hip pocket. In this way, a stumble or fall will not result in injury. It is also a good idea to reinforce the edge of the sheath with extra copper rivets. If there is no strap to hold the knife, run a leather thong through the belt slits in the sheath and tie it around the knife handle.

R. A. Jenkins, St. Louis, Mo.

Sanding Tool for Small Work



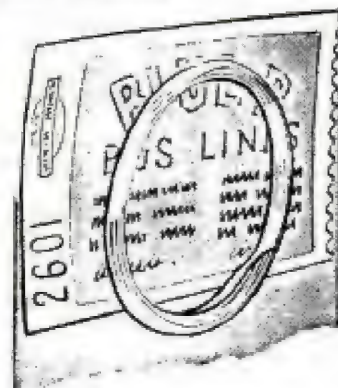
An old safety razor makes an excellent tool for sanding small jobs, especially curved surfaces. A piece of sandpaper is held in place by

tucking the ends between the head and comb of the razor and tightening the handle in the usual way. If very fine sandpaper is used, several pieces can be mounted on the razor and the top one removed when it becomes worn.

Jeff Sterns, New Bedford, Mass.

Key Ring Holds Bus Ticket

One commuter saves the embarrassment of fumbling for his bus ticket by inserting it in a large spring-type key ring. In this way, even though carried in the change pocket, the ticket can be located quickly.



When baby begins to outgrow his high chair, an ordinary kitchen chair with a doorstop screwed into each leg to add height makes a handy youth chair.

SHELF LIGHT

By Don Mohler

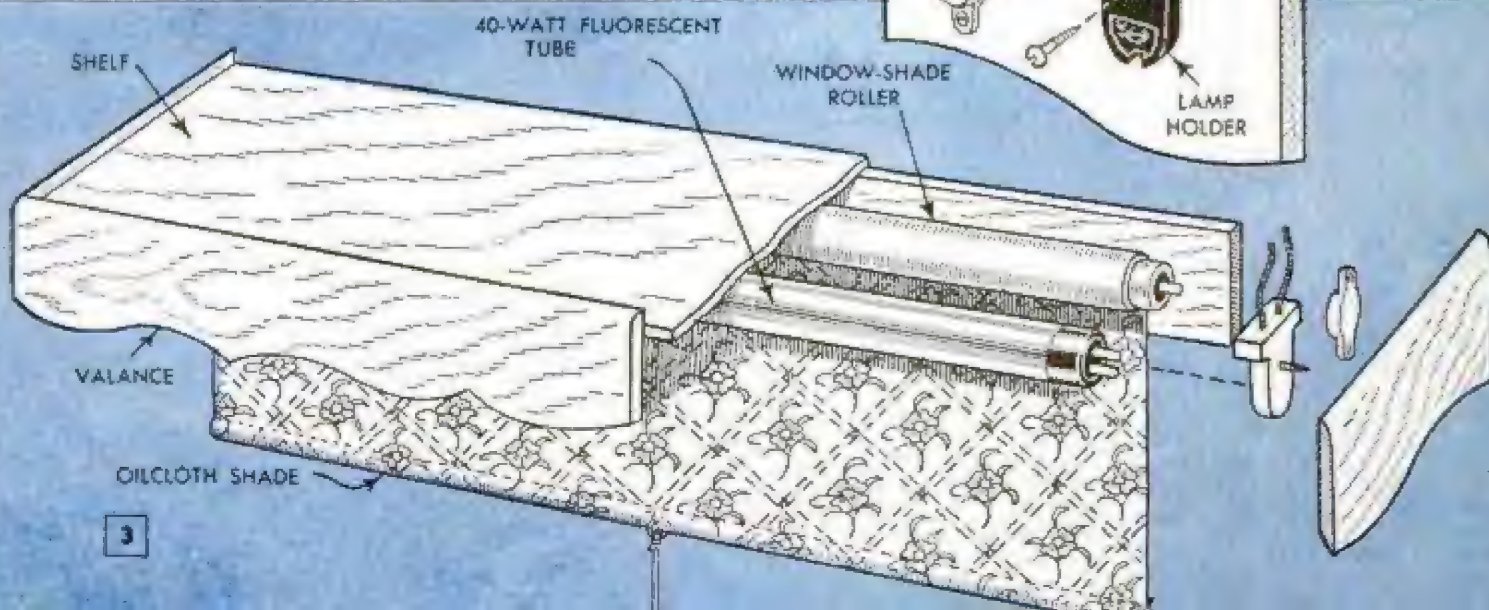
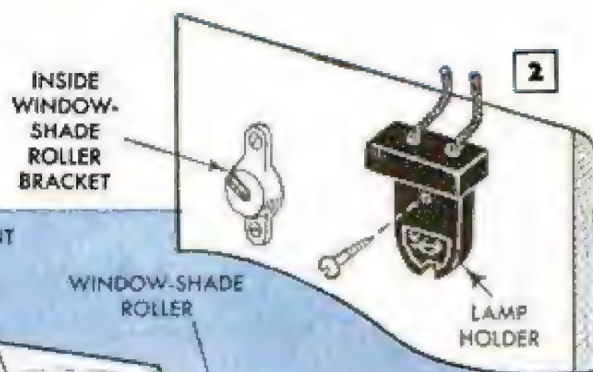
Mounted above a kitchen range, this handy shelf light houses a fluorescent lamp and an oilcloth shade which can be lowered to protect the wall from grease spots. The unit is also a step-saver because its flat top provides an excellent shelf for a canister set.

The lamp parts, which can be purchased at most electrical-supply stores, consist of a 40-watt fluorescent lamp, one lamp holder, one combination lamp holder and starter socket, one automatic or manual-type starting switch and a proper ballast. These parts are wired as shown in Fig. 1. As fluorescent lamps radiate considerably less heat than filament lamps, an all-wood fixture, Fig. 3, can be used. The design of the fixture lends itself to the installation of the roller and the oilcloth shade.

No dimensions are given for the shelf and valance as these can best be determined from the length of the window-shade roller and the tube. The lamp holder must be drilled for a mounting screw, as shown in Fig. 2. The shade roller is held in place with inside brackets and the interior of the fixture is painted white. The exterior is decorated to harmonize with the kitchen.



This combination fluorescent light and window-shade backdrop for the range protects the wall from grease spots and provides extra shelf space and additional illumination to make cooking easier





Furniture You Can Build p. 40



Popular Mechanics presents here a bedroom suite whose beauty lies in simple, modern lines matched by simplified construction appealing to any home craftsman. If you'd like this type of furniture extended to other rooms, write to—

The Craftsman Editor

*Blueprints - Set 1114 - \$2.00
(4 prints in set)*



Furniture for

Part I

PICTURE in your home this beautiful bedroom ensemble in honey maple, limed oak or rich walnut and then try to talk your way out of building it. Mom will want it by tomorrow, and if there is a teen-age daughter in your home she will say, "It's simply out of this world." Designed for flexibility, the pieces are functional and can be arranged, rearranged and interchanged to her heart's content.

All pieces are coordinated in size to fit together in sectional groups — chest, night stands and bed are all the same height. The group features a most practical bed which incorporates built-in storage space in the headboard. The front of it opens wide to reveal a spacious compartment for extra bedding and a roomy drawer pulls out at

POPULAR MECHANICS



Your Bedroom

each end of the headboard to provide storage for shoes. The chest-on-chest unit can be stacked to serve as a five-drawer highboy, or a pair of base units can be built and placed end-to-end under a large mirror to obtain the popular Mr. and Mrs. dresser. A novel three-piece vanity consists of two twin end units bridged with a separate top unit which opens to expose a cosmetic compartment and make-up mirror.

A product of a basement shop, the original furniture was built with the power tools shown. Only two tools, a saw and a jointer, actually are required as the construction involves just simple,

Right, edges of the plywood are mitered with the saw table tilted at a 45-deg. angle and planed accurately on the jointer to obtain a perfect fit

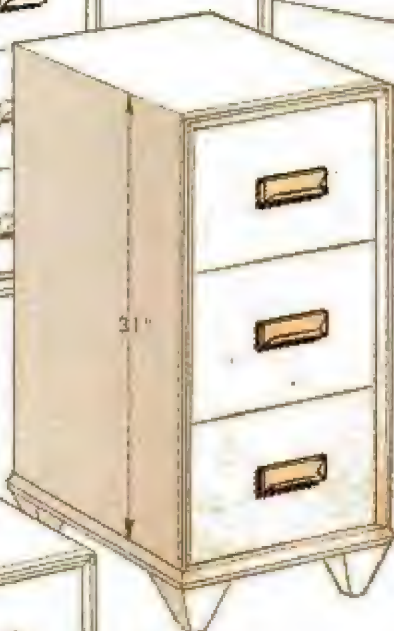




HIGHBOY CHEST



MR. AND MRS. CHEST

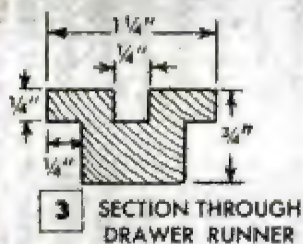


NIGHT STAND

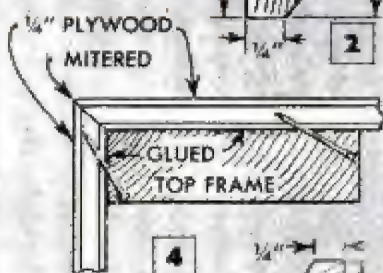


VANITY UNIT

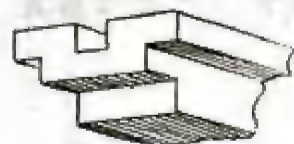
Basic units are highly functional. Place two lowboy chests side by side to obtain the popular Mr. and Mrs. chest ensemble. The two-drawer unit stacked on top of a lowboy makes a highboy. Two vanity units spanned by a separate top unit (to be detailed in Part II) form a vanity or desk.



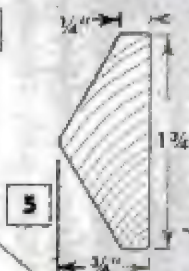
3 SECTION THROUGH DRAWER RUNNER



4



CORRUGATED FASTENER



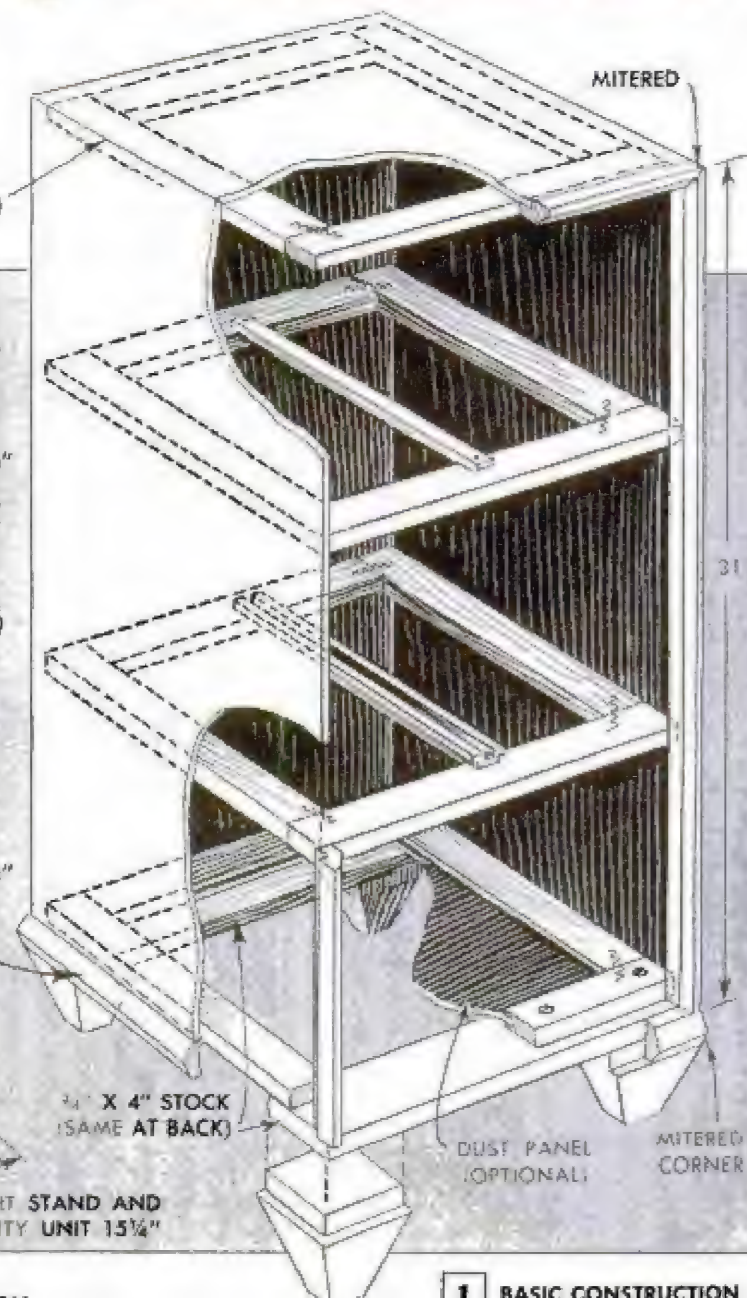
5

ALL FRAMES 18 1/4" DEEP

3/4" X 2" STOCK

NIGHT STAND AND VANITY UNIT 15 1/4"

CHEST 39 1/2"



1 BASIC CONSTRUCTION

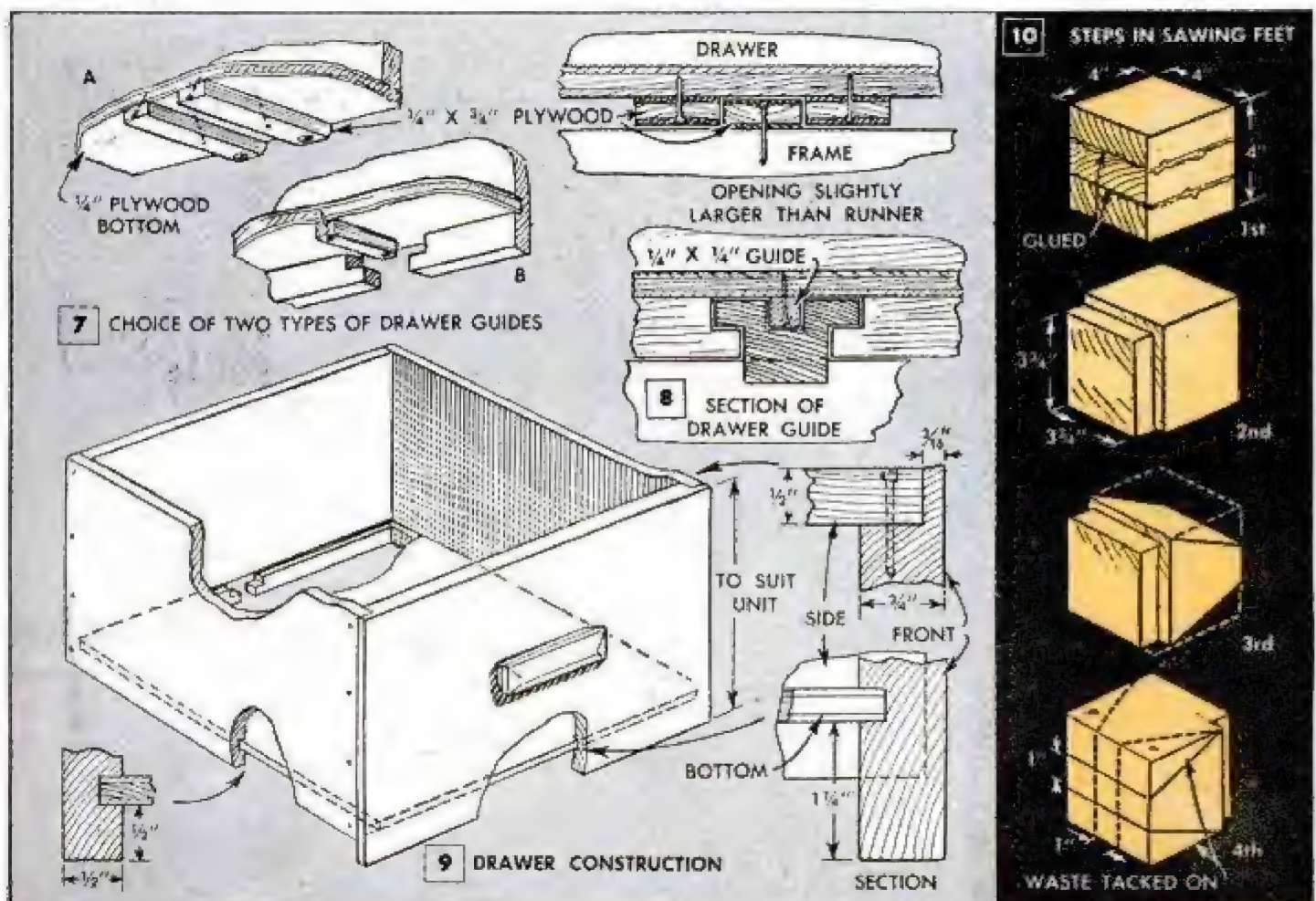
straight cuts in dimensional stock and incorporates the use of plywood to simplify the work. While the feet are shown being cut with a bandsaw, this can be done with a handsaw. Part I describes construction of the vanity units, chests and night stands. Assembly of the bed, vanity top and stool will be explained next month in Part II.

Basic construction of the night stands, chests and vanity units is exactly the same. It's merely a case of increasing the over-all height and width as given for each respective cabinet. Fig. 1 shows the extreme simplicity of construction. Each unit, with the exception of the two-drawer chest, requires three drawer frames and a top frame, four in all, which are made exactly alike as detailed in Fig. 6. Pine or other softwood will do for the frames, although the front rail of each frame can be of hardwood, if you wish. The top frame is of $\frac{1}{2}$ -in. stock while the others are $\frac{3}{4}$ -in., and if the bottom frame is to be fitted with a dust panel, a groove is centered in the edge of the members to take a $\frac{1}{4}$ -in. plywood panel. Otherwise, the frame pieces are merely butted, glued and nailed together with corrugated fasteners.

The next step is to glue and screw the bottom frame to two $\frac{3}{4}$ x 4-in. base pieces. These pieces, which are placed across the front and back, are made the same length as the frame. Note that at the front the

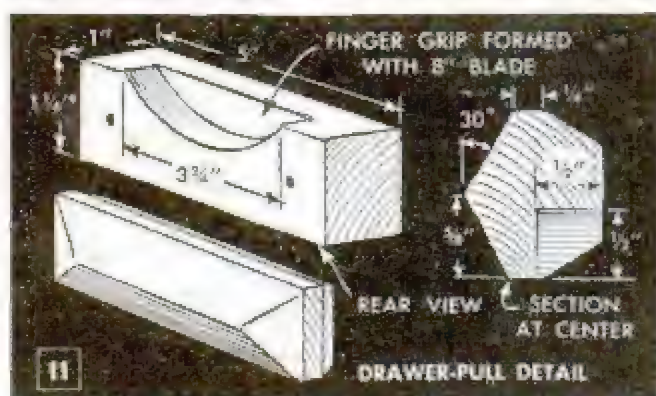


A bandsaw will speed the work of sawing the tapered feet. After two cuts are made, the waste pieces are tacked back on with cardboard between the joint to provide a flat surface for making the other two cuts





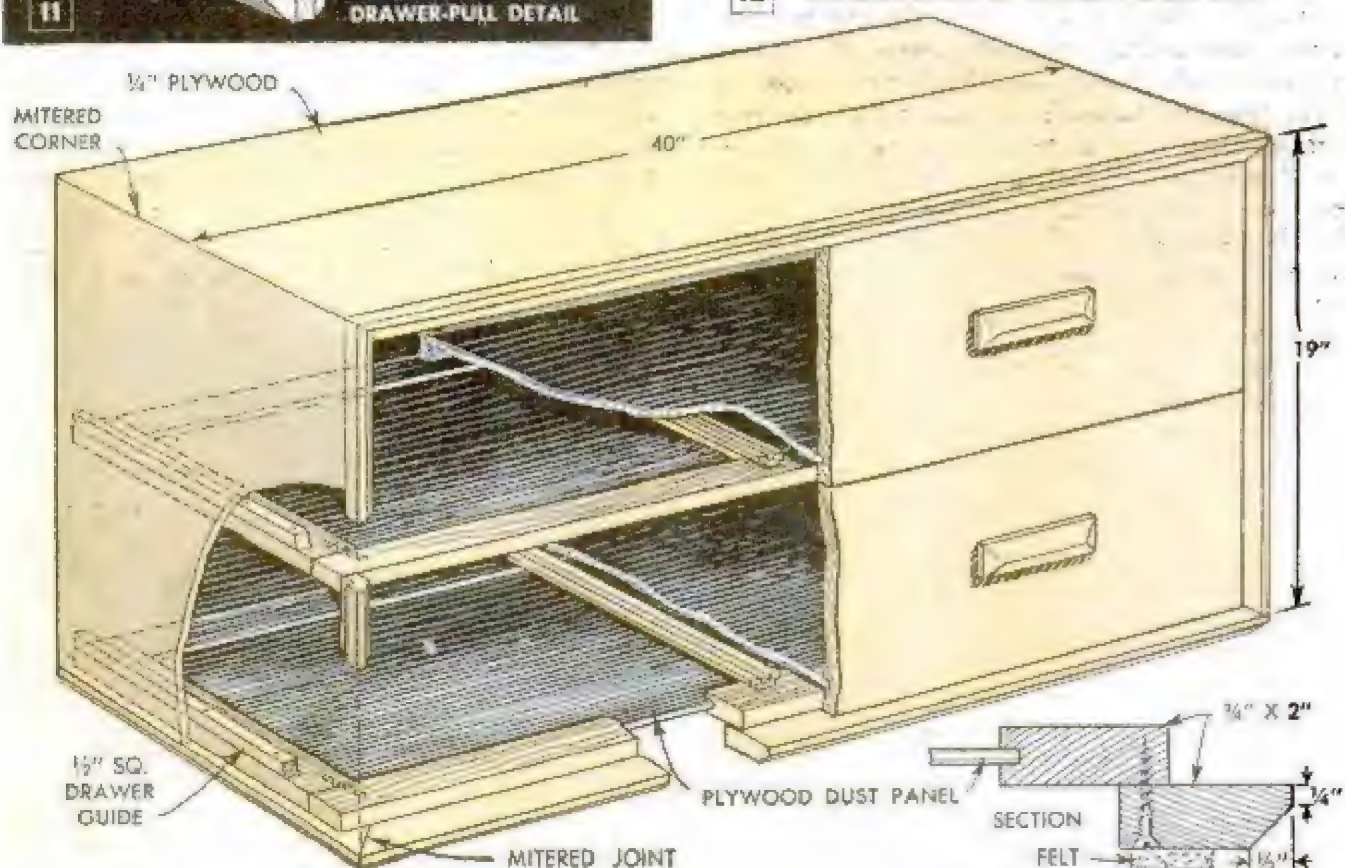
Finger grips in the drawer handles are formed by bringing the work down over the saw blade repeatedly. A block clamped to the table serves as a stop



frame is placed $1\frac{1}{8}$ in. in from the edge, while at the back the frame is glued flush with the edge of the base piece. Now, a $1\frac{3}{4}$ -in. molding, Fig. 5, is mitered and glued to the edges of the base pieces so that it is flush with their top surfaces. The molding along the sides is cut $\frac{1}{4}$ in. longer than the depth of the base to allow for a $\frac{1}{4}$ -in. plywood back. Glue blocks along the sides, plus screws driven at an angle through the edges of the base pieces from the inside, are used to anchor the molding.

The edging which conceals the laminated edges of the plywood at the front is ripped from $\frac{3}{4}$ -in. stock according to Fig. 2. This is mitered and glued together as a separate assembly. The top piece of the edging is cut $\frac{1}{2}$ in. longer than the width of the frame to allow for the side panels. Glue the pieces together on a flat surface and place a temporary brace across the bottom. Next, the top frame is glued to the edging. The frame is kept flush with the rabbeted edge and is fastened with long screws driven through the edge of the frame from the inside. Now, you are ready to attach the edging-and-frame assembly to the base, but first the back panel should be made ready as this is installed at the same time. The plywood back panel is made the same width as the frames and is cut $\frac{1}{4}$ in. less than the length of the edging. Nail the panel to the back edges of the top and bottom frames and then coat the ends of the edging strips with glue and clamp to the base with bar clamps. After the glue has dried, drill a pilot hole

12 CONSTRUCTION OF HIGHBOY-CHEST UNIT



up into the end of each strip and drive a No. 9 1½-in. flat-headed screw. The remaining two frames are spaced equally between the top and bottom ones. These are fastened to the inside of the edging strips with small screws. Pockets are formed for the screws by drilling and counterboring holes through the frame at an angle.

Now, the framework is ready to be covered with ¼-in. plywood. Fit and install the top piece first. In addition to obtaining a well-fitting mitered joint, it also is important to get a tight fit where the plywood abuts the rabbet of the front edging. Use bar clamps to draw this joint tightly and C-clamps to clamp the plywood firmly to the frame. Brads can be used here, as indicated in Fig. 4, although a good resin-type glue will hold sufficiently. Like the top piece, the sides fit flush with the outer face of the edging and the molding at the bottom. Clamps should be used to draw the mitered joint together and, if you do not object to surface nailing, brads can be used to reinforce the joint and to nail the plywood to the edge of the frames.

Steps in sawing the feet are given in Fig. 10. In most cases, the blocks for these will have to be glued up using three or more pieces. The front feet require a ¼ x 1-in. rabbet on two adjacent edges, while the rear ones need a rabbet only along one side. The feet taper to 1 in. square at the bottom. After sawing two sides, the waste is replaced and held with either brads or cellulose tape so that a flat surface will be had to complete the sawing.

Typical drawer construction is detailed in Fig. 9. The method of fitting the bottom differs somewhat with the type of drawer runner used. Note that the lower edge of each drawer extends to cover the drawer frame. Drawer handles are detailed in Fig. 11. A choice of two types of drawer guides is given. One features a T-shaped runner, Fig. 3, over which the back of the drawer hooks to prevent the drawer from dropping down when all the way open. The runner is grooved for a ¼-in.-square guide, which is nailed to the underside of the drawer bottom as shown in Fig. 7, detail B. Note that the T-slot in the drawer, Fig. 8, is made slightly larger than the cross-section of the runner. A more simple guide is pictured in Fig. 7, detail A. This is formed merely by nailing two strips of plywood to the drawer bottom to form a track for a plywood runner nailed to the frame. Fig. 1 shows both types of runners in place.

Construction of the highboy (two-drawer) chest unit, Fig. 12, differs from the other units in one respect; the bottom drawer frame is screwed to a mitered base frame which is beveled to match the edging.

(To be continued)

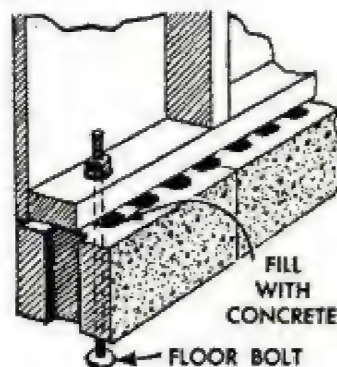
Glove Holds Small Tools In Car Compartment



To prevent the rattling of small tools carried in the dashboard compartment of a car, insert them in the fingers of an old leather glove. This keeps the tools together but eliminates annoying metal-to-metal contact.—William Swallow, Brooklyn, N. Y.

Basement Partitions Elevated On Concrete Blocks

Because the lower portion of his coalbin wall was beginning to decay due to dampness, one man made a foundation for the wall from concrete blocks. He cut off the partition and installed a new sill at the correct height to permit the blocks to fit under it. Bolts anchored in the concrete floor with molten lead pass through the blocks and sill, as shown. Holes in the blocks then are filled with concrete. This method also prevents the walls from spreading when the bin is filled with coal.—Ernest M. Woerner, Eureka, Ill.



Shading Aids Pattern Tracing

Transferring drawings from one squared pattern to another is simplified and possibility of error reduced by shading alternate squares of both patterns with a pencil. This permits noting at a glance through which square the line is passing. As a further aid, the squares can be numbered correspondingly.



Paint Swatch on Piece of Glass Aids Matching Colors

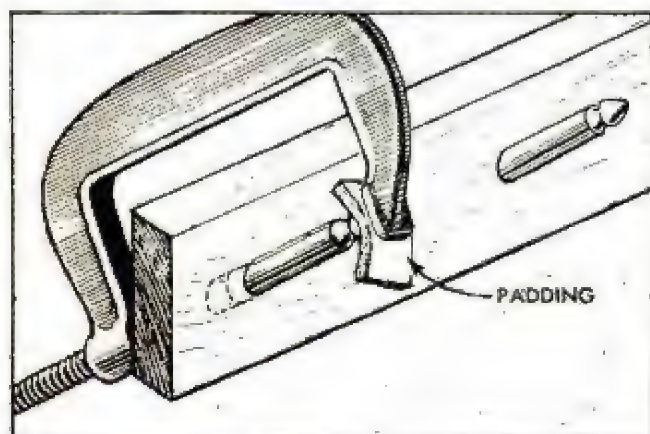


To simplify mixing paint to match work already done, smear a little of the mixed paint on a piece of window glass. Then hold the glass against the surface to be matched and compare the colors. If the swatch doesn't match, wipe it from the glass before applying another sample.

G. E. Hendrickson, Argyle, Wis.

C-Clamp Used to Drive Pegs Does Not Damage Point

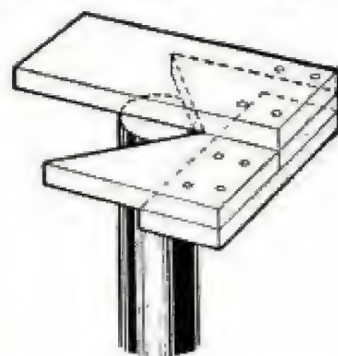
Here's a trick, which I learned while making a ringtoss game, that can be applied to similar projects where pegs are used. I wanted the pegs to fit in undersize holes but the fact that the ends of the pegs were pointed created the problem of how to drive them without damaging the turned ends. I solved the problem by padding the ends of the pegs with a piece of thick felt



and using a C-clamp, in the manner shown in the drawing, to force the pegs into the holes.—H. Klein, Pittsburgh, Pa.

Jig Locates Wood-Turning Centers

Centering wood turnings is done quickly with this simple jig. It is made from four pieces of hardwood ($\frac{1}{4}$ -in. stock was used in the original). Two pieces are mitered at a 45-deg. angle and nailed to a cross-piece to form a 90-deg. angle at the center of the jig. A fourth piece, used as a straight-edge, is nailed to the top of the jig so one edge bisects the 90-deg. angle. To use the jig, place it over the end of the turning and draw a line along the straightedge. Then, rotate the turning a quarter turn and draw another line. The intersection of the two lines is the center of the turning.



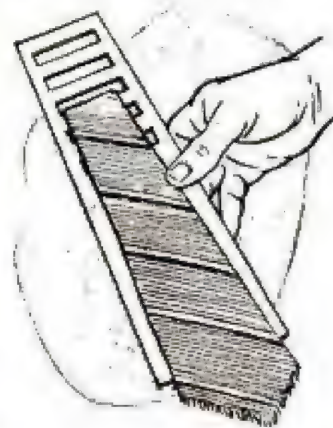
Herbert E. Fey, New Braunfels, Tex.

Calking Compound Patches Plaster

One man who found that ordinary patching plaster would not stick to his walls because of vibration filled the cracks with calking compound. Before painting, he applied the calking with his finger to the cracks and around the top of the base molding. The result was a neat, inexpensive job of patching. The calking compound should be allowed to set before paint is applied.—G. W. Marker, Tucker, Ga.

Cardboard Tie Rack for Suitcase

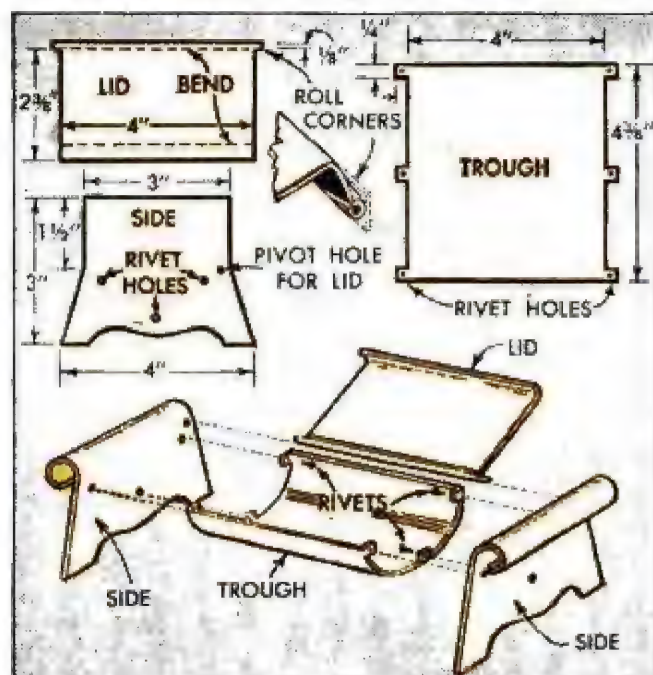
For the traveler who opens his suitcase only to find his ties wrinkled, this simple rack, cut from a piece of stiff cardboard, will keep ties neatly pressed. The size of the rack and the number of slots depends, of course, on the number of ties to be carried. If a more permanent rack is desired, use plywood or plastic instead of cardboard.



J. Harley Hosack, Hartford, Conn.

Ⓢ Prevent damage by closing slide fasteners before washing outdoor garments.

Unusual Cigarette Box Looks Like Armchair



Made of sheet aluminum or copper, this novel cigarette box resembles a miniature chair when open. It consists of four pieces: two sides, a semicylindrical trough, and a pivoted lid. Although the box illustrated was designed for extra-long cigarettes, it can be made smaller for standard-length cigarettes by changing the 4-in. dimension of the lid and trough to 3 in. First, lay out the pieces on 16 or 18-ga. sheet metal and cut them to size with tinner's snips. Round the sharp edges with a file or emery cloth and drill rivet holes through the six tabs on the trough. The trough and sides are formed around a wooden dowel or a piece of pipe wrapped with heavy paper. To

avoid hammer marks when bending, use a wooden or rawhide mallet. Bend the tabs on the trough at right angles and use the trough as a template for drilling the rivet holes in the sides of the box. Two additional holes, one in each of the sidepieces, must be located and drilled for the hinge prongs of the lid. When assembling, insert the prongs in these holes before riveting the sides to the trough. The box is finished by buffing to a high luster or rubbing with fine emery cloth to a satin finish. The buffing can be done with a soft wheel charged with polishing rouge. A coat of clear lacquer will prevent the metal from tarnishing and thus eliminate frequent polishing.

Polished Tool Surfaces Rustproofed by Coating With Paste Wax



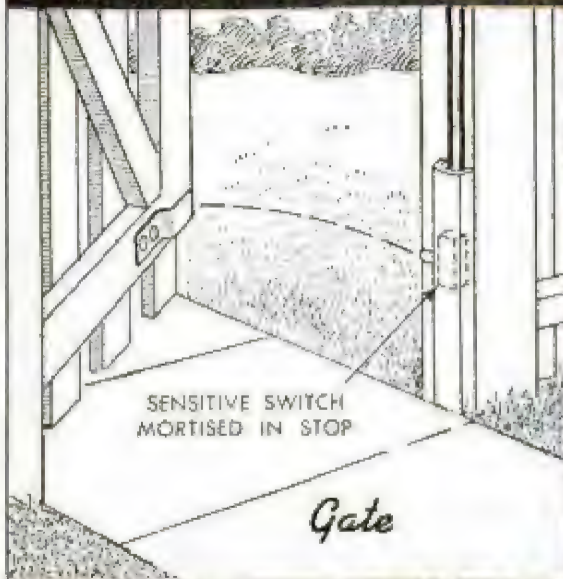
A coat of paste wax applied to the polished surfaces of saw blades, squares, etc., before storing them, affords adequate rust protection and does not necessitate removing before using the tool. The wax melts when the saw blade is in use and acts as a lubricant. The tools also are cleaner to handle than if coated with grease.

Refilling Lipstick Containers

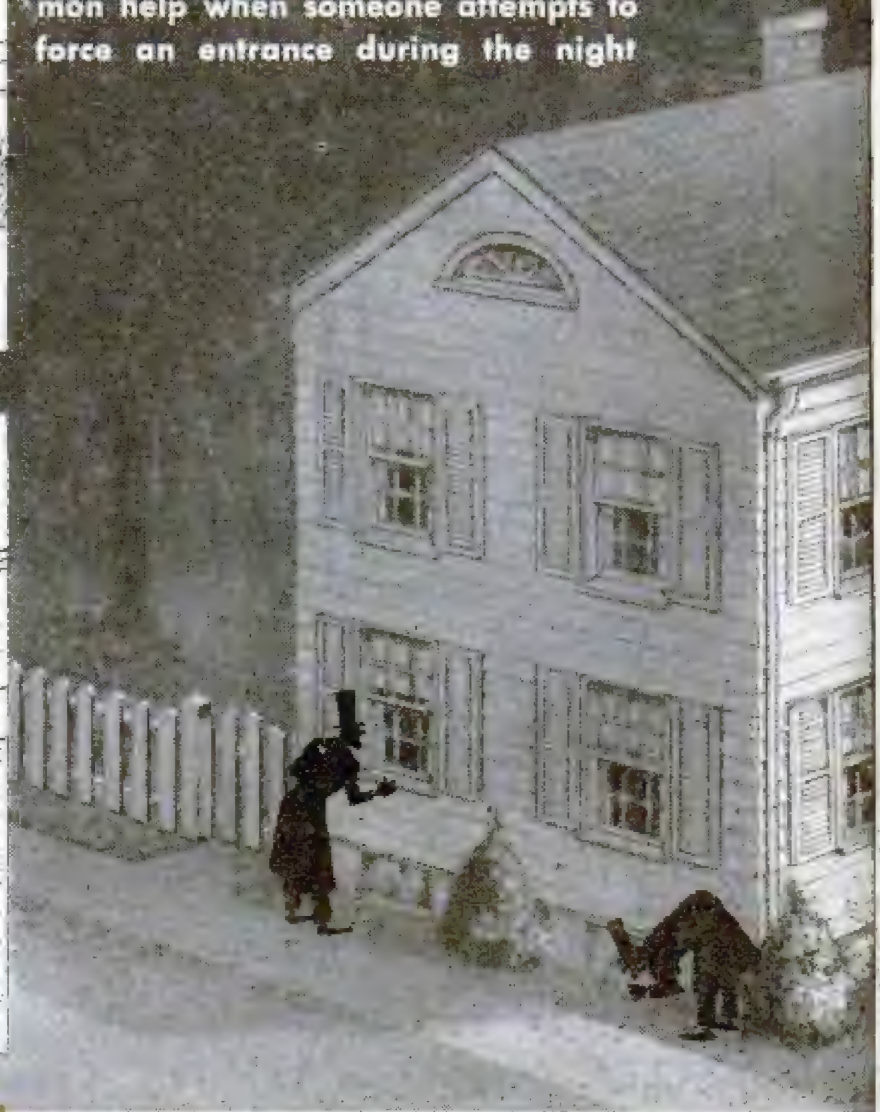
It's easy to refill a lipstick container if both the refill and case are chilled. When both are thoroughly chilled, the old lipstick will slip out of the container easily and the refill can be inserted without breaking.—Alice Guiles, Syracuse, N. Y.

¶ You will get better light radiation from luminous paint that is to be applied over an old painted surface if you first apply a base coat of white lead to the particular spot.

DON'T BE CAUGHT



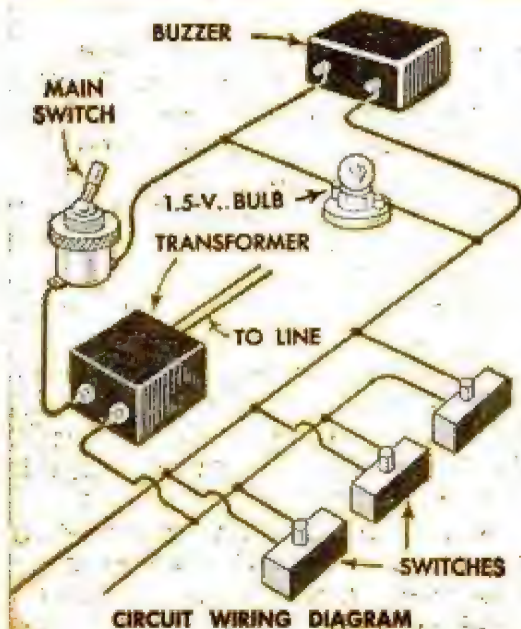
Wiring sensitive switches on doors and windows of your home and garage may not keep intruders out but it will give warning and permit you to summon help when someone attempts to force an entrance during the night



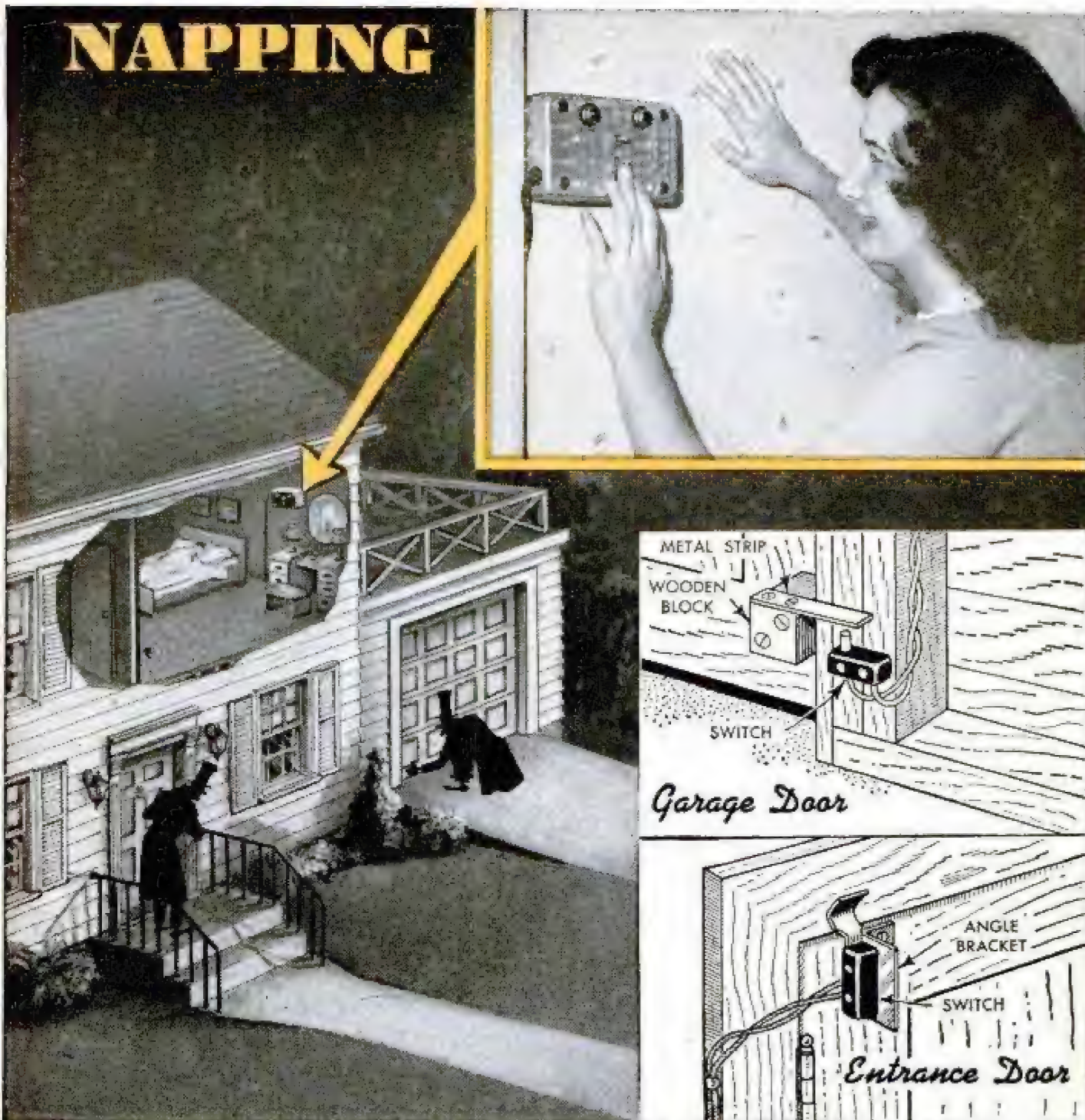
By Thomas E. Stimson, Jr.

YOU'LL get the jump on prowlers before they break in if electrical "night watchmen" are installed on doors and windows to tip you off. When a window or door is opened, pressure on tiny switches is relieved, causing a circuit to close and sound a buzzer in the bedroom. By wiring small lamps into separate circuits for the front and rear of the house, they will glow when the circuit is closed to indicate at a glance the part of the house being invaded. The system also can be wired to automatically turn on exterior floodlights and scare away intruders.

Each circuit consists of a master switch, a 6-volt buzzer, a 1.5-volt lamp and as many sensitive switches as required. These are wired as shown in the diagram to operate either off the doorbell transformer or four dry cells, and are



NAPPING

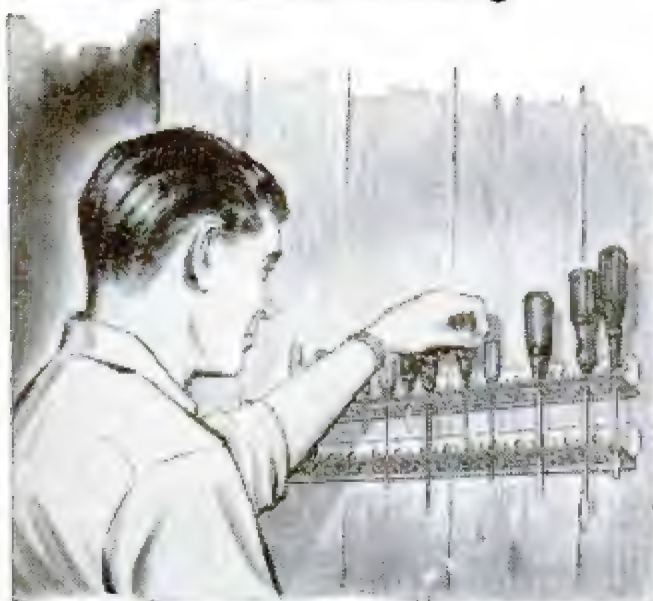


placed in a little box which is mounted on a wall where it can be seen readily. The sensitive switches are wired in parallel in an open circuit, using bell wire for the installation. The easiest way to install the wiring is to merely run it along the woodwork, fastening the wire with small insulated staples. However, if your home is a one-story dwelling, the wiring can be concealed in the walls by drilling up from the basement. Closing of any one sensitive switch completes the circuit and sounds the buzzer. Normally, the master switch in each circuit is left open during the day and closed when retiring. Sensitive switches are available at most electrical stores and sometimes as war surplus. They should be of the type that remain open when depressed. The accompanying drawings sug-

gest methods for mounting the switches on gates, basement windows and doors. Mounting a switch on a standard double-hung sash is done similarly to the method shown for an overhead garage door. With a little ingenuity the switches may be adapted to fit any door or window. Switches also can be arranged to work on window screens and screen doors during the summer months.

Heat switches may be used in connection with the sensitive switches to warn the family of fire. These are set to close at 180 deg. F. and are mounted near the ceiling of a room. A chicken-brooder control switch is ideal for this purpose or an automobile thermostat may be mounted on a suitable bracket to operate a sensitive switch when the thermostat expands.

Simple Rack for Small Tools Made From Corner Beading



Two lengths of metal corner beading nailed to a wall, one above the other, provide an excellent rack for small files, screwdrivers and chisels. Make the rack long enough to store all your tools of this type, and grind off the sharp corners of the beading before nailing it to the wall.

Will Stoll, Elmhurst, Ill.

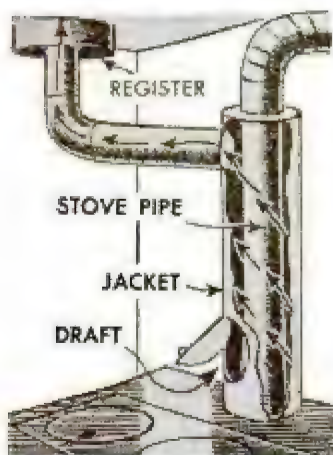
Cellulose Tape Masks Glue Joints



Scraping excess glue from wood joints is eliminated if the parts are masked close to the joint with cellulose tape. This makes it easy to strip off the hardened glue by removing the tape.

Cookstove Heats Upper Rooms

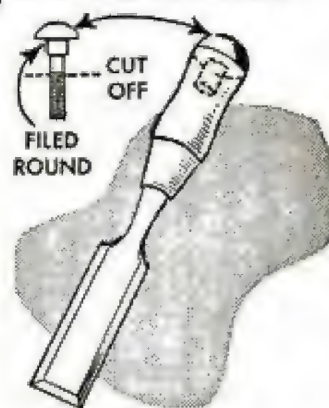
In one home, an upstairs bedroom is heated by jacketing the stove pipe of the kitchen range to retain waste heat. The heat then is piped into the bedroom through a ceiling register. The sheet-metal jacket, about 4 in. larger in diameter than the smoke pipe, is closed at the top except for an opening from which a length of small-diameter pipe runs to the ceiling register. A



hole near the bottom of the jacket serves as an air intake and the amount of air is controlled by a hinged cover over the hole.

Carriage Bolt Caps Chisel Handle

An ordinary carriage bolt makes an excellent replacement for a broken metal cap on a plastic chisel handle. First, the stub of the broken cap is drilled out and a carriage bolt is selected to fit tightly into the hole. Then the bolt

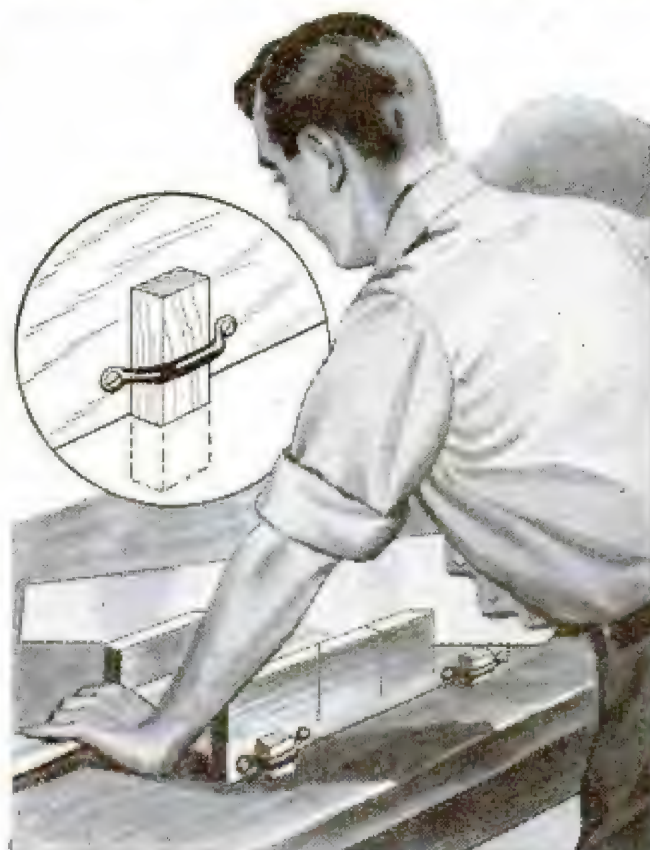


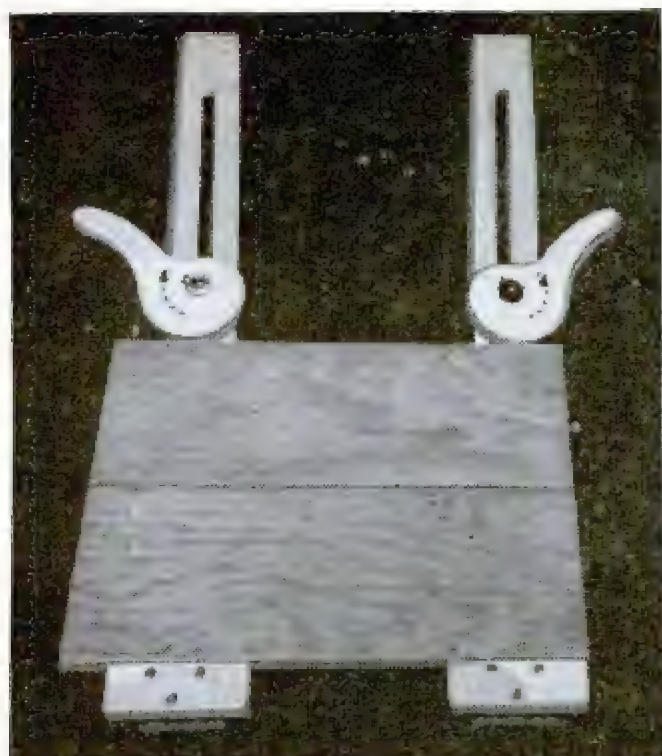
is cut to length and the squared section ground or filed round. Before the bolt is pressed into the handle, a narrow flat is filed along one side of the bolt to permit the air in the handle hole to escape as the bolt is inserted.

Paul L. Kauffman, Orrville, Ohio.

Wide Miter Box Held Steady By Workbench Stops

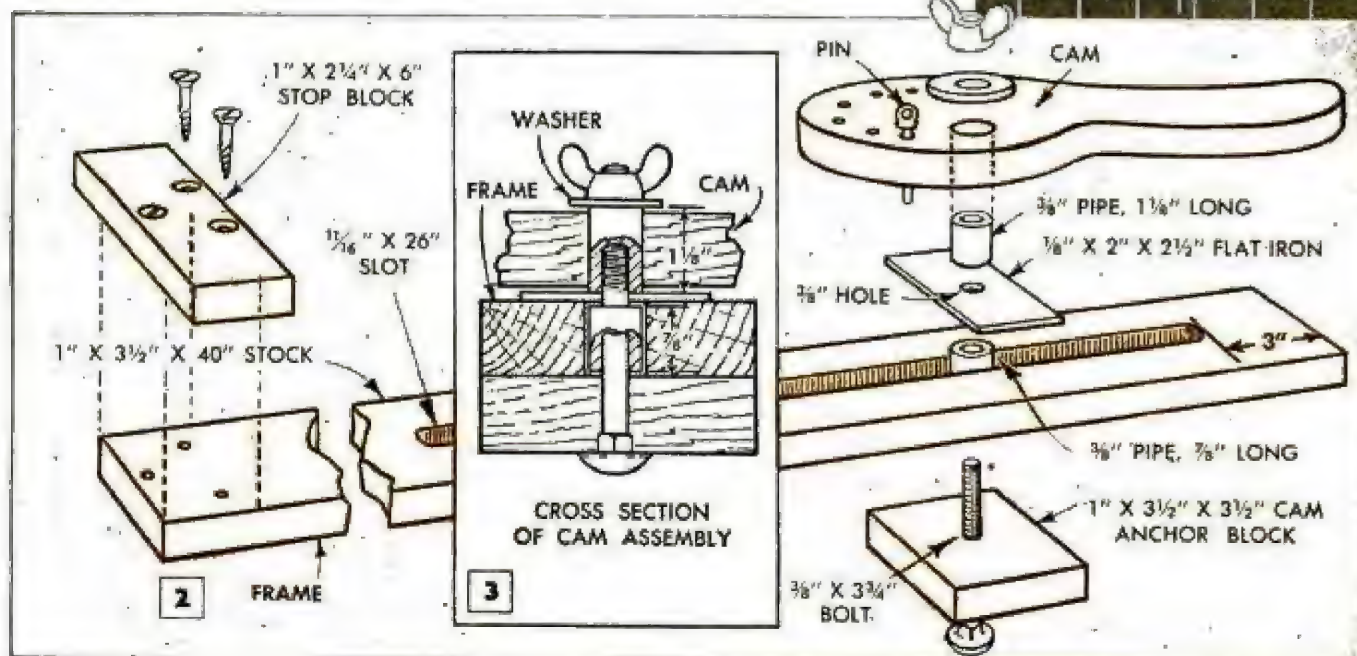
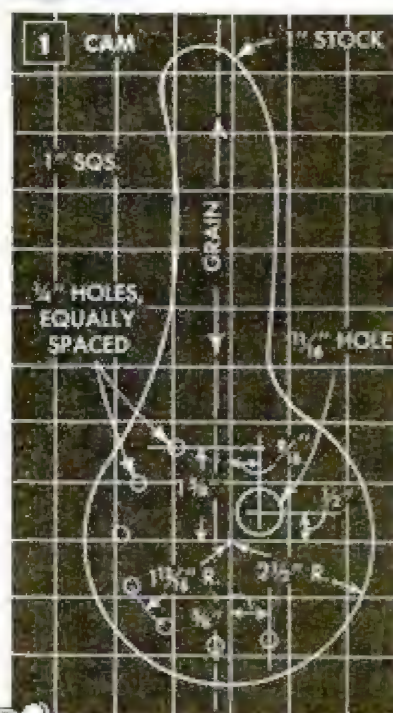
One craftsman who uses a homemade miter box that is too wide to be gripped in a vise, holds the box steady by means of a pair of screen-door handles and the stops on his workbench. He screwed the handles to one side of the box so they would fit over a pair of stops but would not interfere with the saw blade when making angle cuts.



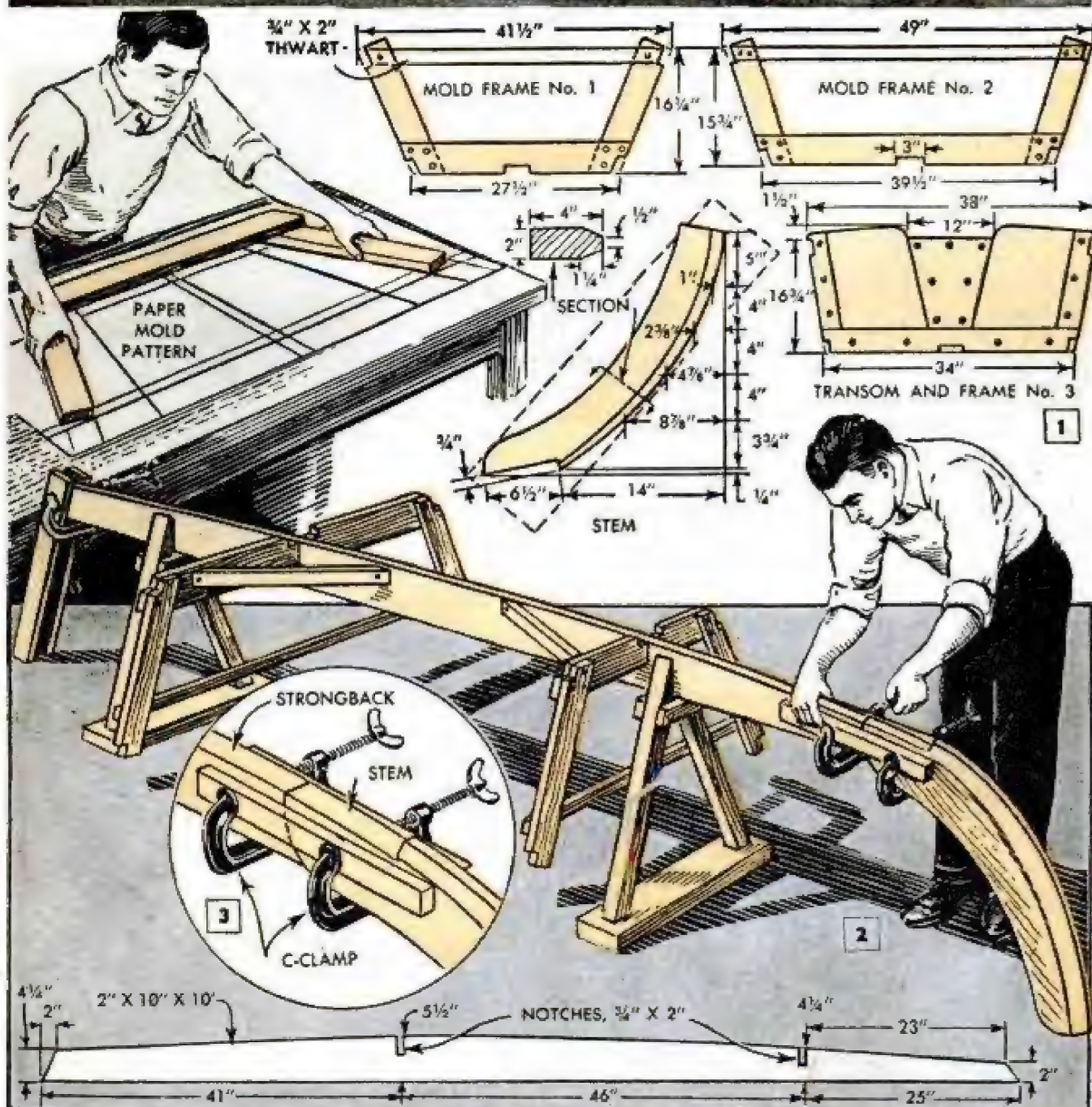


CAM-ACTION CLAMPS

If an occasional gluing job does not warrant investing in expensive bar clamps, excellent cam-action ones of hardwood can be made at very little cost. These clamps are adjustable and withstand considerable pressure. First, make the frame, slotting it for the cam assembly and fitting it with a stop block as in Fig. 2. Next, cut out the cam, Fig. 1, and drill it for a pivot bolt. After this, assemble the cam to the frame by inserting the pivot bolt through an anchor block, two bushings and a piece of flat iron. The latter clamps the assembly to the frame and the lower bushing facilitates moving the cam in the slot. Note that a series of holes for a locking pin is drilled near one edge of the cam. To use the clamp, set the work against the stop block, tighten the cam about $\frac{1}{4}$ in. from the edge of the work and then adjust the cam to exert pressure on the joint. Finally, lock the cam by slipping a locking pin (a screw eye will do) through one of the holes and against the edge of the frame.



11½-Ft. PLYWOOD



ROWBOAT *Carried on Car Top*



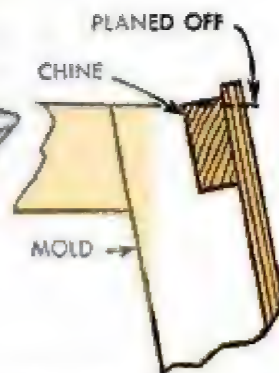
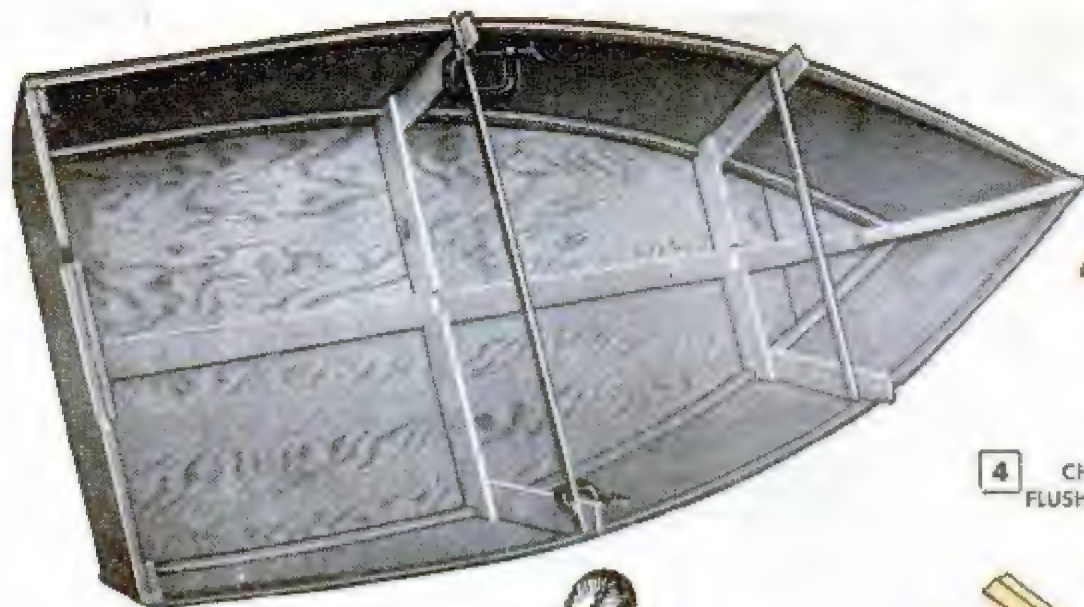
IF YOU CAN use a saw, hammer and plane, you can easily master the construction of this simple car-top rowboat. There are no tricky planks to fit and no difficult rabbet to cut in the stem. Not counting the transom, only two mold frames are required, Fig. 1, and as the molds are only temporary, their assembly is not too important other than seeing that they are put together squarely. To assure this, make a full-size paper pattern of each mold and assemble the pieces directly on the patterns. The transom is $\frac{3}{4}$ -in. plywood to which a notched frame is glued and screwed permanently to the inside face.

Next, the transom, molds and stem are fastened to a strongback or building board.

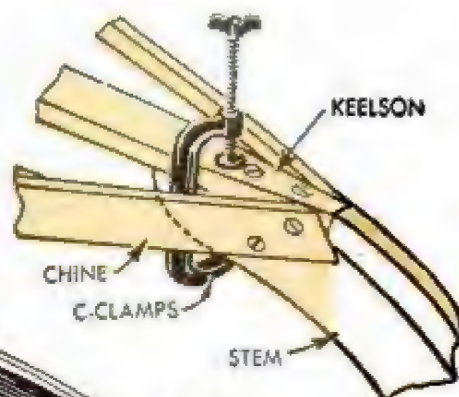
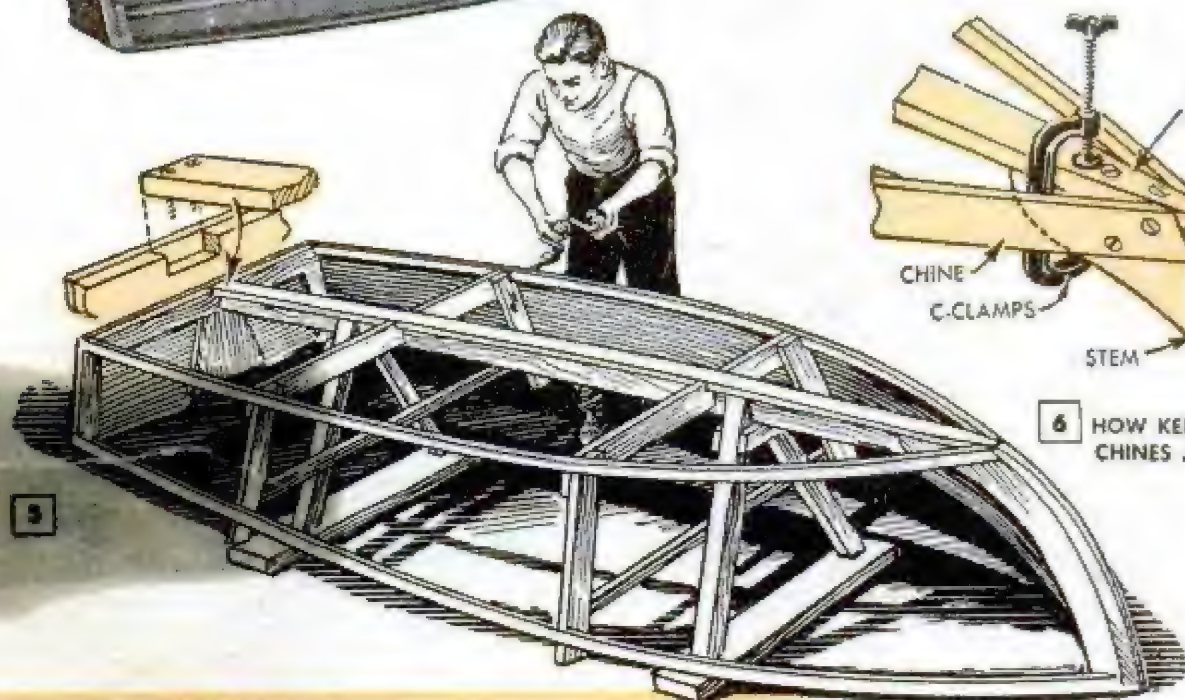
By William D. Jackson

This is cut from a plank, as indicated, and is supported in the manner shown in Fig. 2. The stem is clamped to the strongback as in Fig. 3 and the transom is clamped to two scrap boards which are clamped at an angle to the opposite end of the strongback, Fig. 11. The molds are leveled laterally and braced at right angles to the strongback.

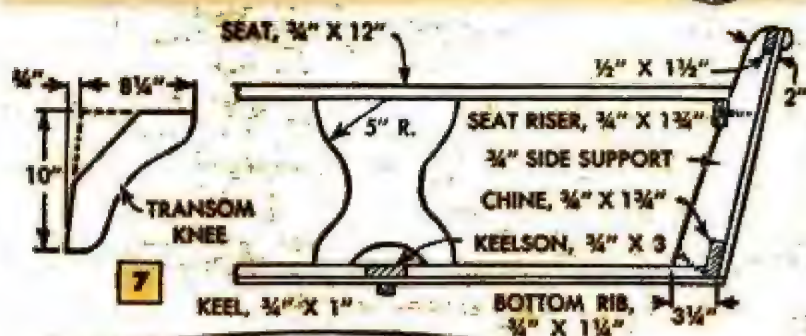
Fig. 5 gives a general idea of how the keelson, chines and sheer battens are fitted. These parts simply rest in the notches of the molds and are fastened only to the stem and transom. The keelson and chines are fastened to the stem as in Fig. 6, using $1\frac{3}{4}$ -in. No. 8 flat-headed brass screws. One screw is used to fasten each aft end of the chines and sheer battens to the transom.



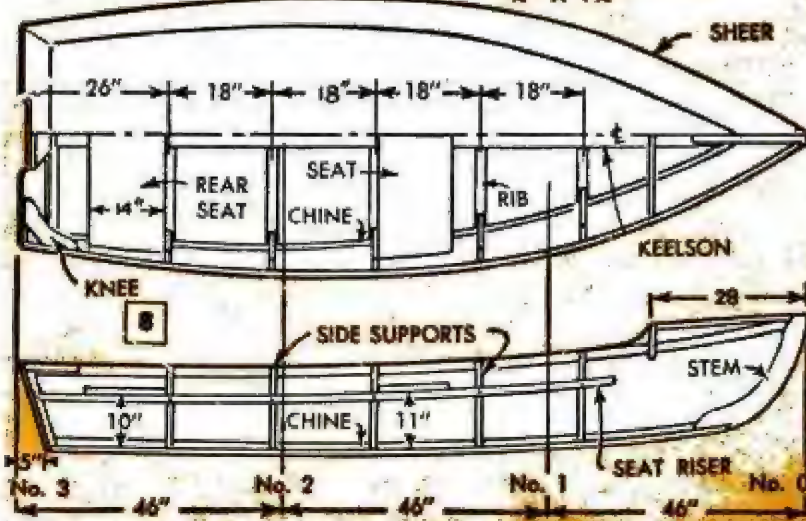
4 CHINE AND SIDE FAIRED FLUSH WITH FRAME BOTTOM



6 HOW KEELSON AND CHINES JOIN STEM



7



8

The framework is now ready to be covered with marine plywood. Apply the sides first by clamping the plywood temporarily in place and marking it a little oversize for sawing. To make a watertight joint along the chine, coat it with marine glue and lay muslin tape in the glue. Then apply a second coat to the tape and attach the plywood with 1-in. No. 8 flat-headed screws, spaced 2 in. apart. When dry, plane off the chine and plywood flush with the bottom of the molds as in Fig. 4. For the sake of economy, the plywood bottom can be applied in two or more pieces, Fig. 12, using copper clinch nails along a cleat-backed joint. The exposed edges of the plywood at the stem are faired into the curve of the stem, then coated with marine glue and covered with a strip of half-

MATERIAL LIST

Lumber:

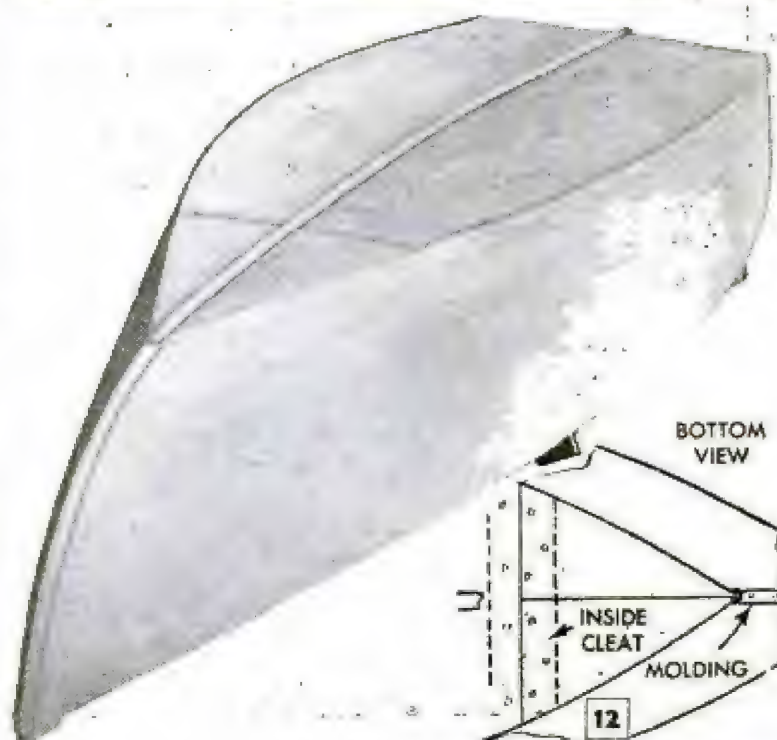
- Waterproof plywood
 1 pc. $\frac{1}{4}$ x 48 in. x 10 ft.—Bottom
 1 pc. $\frac{1}{4}$ x 48 in. x 12 ft.—Sides
 1 pc. $\frac{1}{4}$ x 36 x 36 in.—Deck
 1 pc. $\frac{3}{4}$ x 18 x 48 in.—Transom
 Spruce, fir, cypress or yellow pine
 1 pc. $\frac{3}{4}$ x 6 x 30 in.—Deck beam
 1 pc. $\frac{3}{4}$ x 3 in. x 10 ft.—Keelson
 1 pc. $\frac{3}{4}$ x 1 in. x 10 ft.—Keel
 2 pcs. $\frac{3}{4}$ x $1\frac{3}{4}$ in. x 12 ft.—Chines
 2 pcs. $\frac{1}{2}$ x $1\frac{1}{2}$ in. x 12 ft.—Sheer battens
 1 pc. $\frac{3}{4}$ x 3 in. x 6 ft.—Transom frame
 2 pcs. $\frac{3}{4}$ x $3\frac{1}{4}$ in. x 8 ft.—Side supports
 2 pcs. $\frac{3}{4}$ x $1\frac{3}{8}$ in. x 10 ft.—Bottom ribs
 2 pcs. $\frac{3}{4}$ x 1 in. x 12 ft.—Molding
 Redwood, spruce
 1 pc. $\frac{3}{4}$ x 14 x 48 in.—Rear seat
 1 pc. $\frac{3}{4}$ x 12 x 48 in.—Forward seat
 Oak, ash or yellow pine
 1 pc. 2 x 8 x 30 in.—Stem
 1 pc. $\frac{1}{2}$ x 1 x 24 in.—Stem molding
 1 pc. 1 x 10 x 18 in.—Transom knees
 1 pc. $1\frac{3}{4}$ x $5\frac{3}{4}$ in. x 10 ft.—Building board
 2 pcs. $\frac{3}{4}$ x $3\frac{3}{4}$ in. x 8 ft.—Scrap stock frames
 Hardware:
 4 gross 1-in. No. 8 flat-head brass screws
 1 gross $1\frac{1}{4}$ -in. No. 8 flat-head screws
 3 doz. $1\frac{3}{4}$ -in. No. 8 flat-head screws
 1 lb. $1\frac{1}{4}$ -in. galvanized shingle nails
 1 pr. earlocks
 3 brass lifting handles
 1 mooring eyebolt
 $\frac{1}{2}$ pt. marine or phenol-resin glue
 Muslin tape
 Paint and varnish



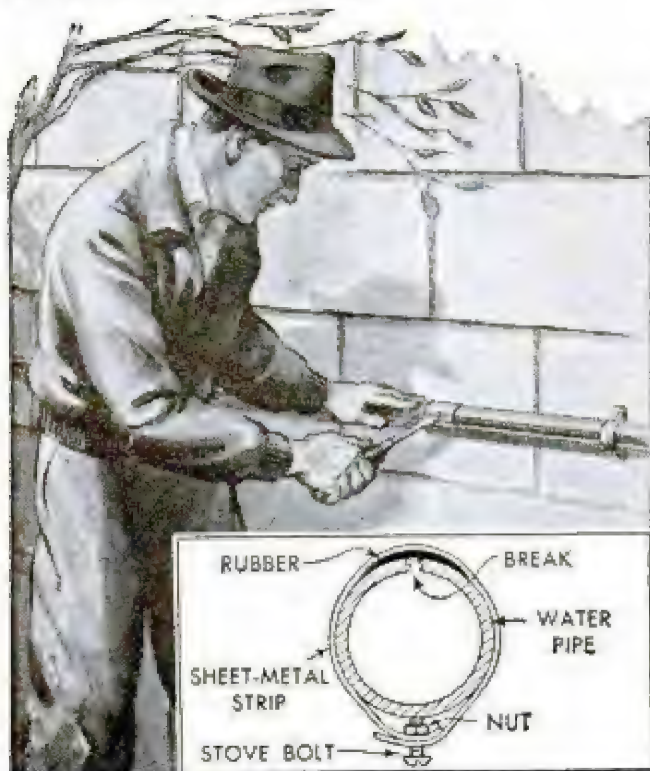
round molding to meet the keel.

Now, lift the boat from the strongback, but before removing the molds, place a temporary cross brace between the sheer battens to maintain shape until the seats are installed. Complete the deck as shown in Fig. 9, fitting a deck beam, Fig. 10, 28 in. from the stem. Five supports are fitted to each side of the boat on the inside at points indicated in Fig. 8. These are notched to fit over the chines and sheer battens as shown in the sectional view, Fig. 7. This step is followed by installing the ribs which are notched to straddle the side supports and simply butt against the keelson and chines. Copper or other rust-resistant nails are used to fasten the ribs to the plywood, the nails being clinched on the inside. Complete the boat by adding the transom knees, seat risers, seats, keel and the half-round sheer molding.

Use a copper bottom paint on the bottom of the boat and coat the rest of the wood above the water line with a lead-and-oil primer paint. Then finish with two full-bodied coats of deck enamel. A mooring eyebolt and three brass sash lifts screwed to the top edge of the transom provide convenient hooks for lashing the boat securely with rope to the car bumpers.

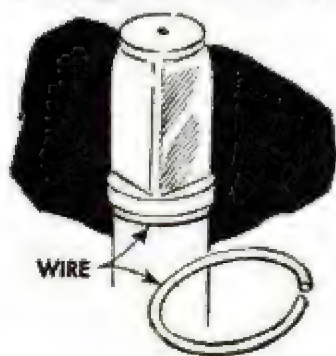


Rubber Seal Repairs Split In Frozen Water Pipe



Breaks in exposed water pipes caused by a sudden freeze are repaired in a jiffy by sealing the crack with a piece of inner tube held by a sheet-metal clamp. The metal is cut into a strip slightly wider than the length of the break and long enough to overlap an inch or so when bent around the pipe. A hole for a stove bolt is punched or drilled through the overlapping parts of the metal. With the inner tube and clamp in place, the stove bolt is inserted through the holes and turned into a nut. The end of the bolt bears against the pipe and the nut draws the sheet metal outward, tightening it against the rubber on the opposite side of the pipe. If the break is more than 1 in. long, two bolts probably will be required to hold the clamp.

Wire Ring Takes Up End Play Of Agitator Drive Shaft



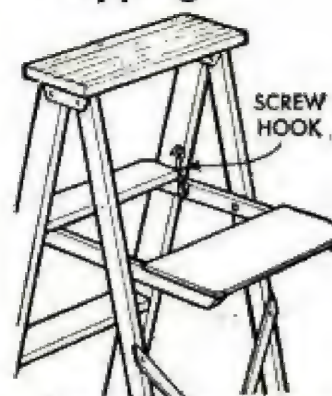
Scraping of the agitator on the bottom of a washing-machine tub often is due to wear at the top of the drive-shaft housing which allows the agitator to ride too low. One or more turns of copper wire between the top of the drive shaft and the housing usually will raise the driving shaft and, in turn, the agitator enough to clear

the bottom of the tub. Remove the agitator and pull up on the drive shaft to separate the top of the shaft from the housing enough to permit inserting the wire.

R. G. Hearn, Monticello, Iowa.

Screw Hook on Stepladder Shelf Prevents Accidental Tipping

The locking leg spreaders on a stepladder usually will prevent the folding pail shelf from accidentally tilting when moving the ladder from place to place. However, as a precaution against the spreaders unlocking and collapsing the legs when a pail or can of paint is on the shelf, attach a screw hook to the inner side of one of the shelf arms. Then turn a screw eye into the corresponding ladder leg so that when the hook is inserted in the eye the shelf arm will be held securely.



Victor H. Lamoy, Upper Jay, N. Y.

C-Clamp Provides Inexpensive Vise For Child's Workbench

A small-boy's workbench is fitted with a serviceable vise at low cost by screwing a C-clamp to one end of the bench top. Position the clamp so that the handle will clear the top when the clamp is fully closed.

John Krill, North Lima, Ohio.



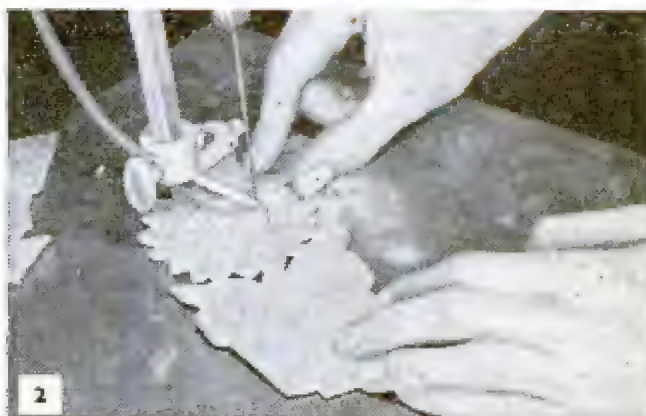
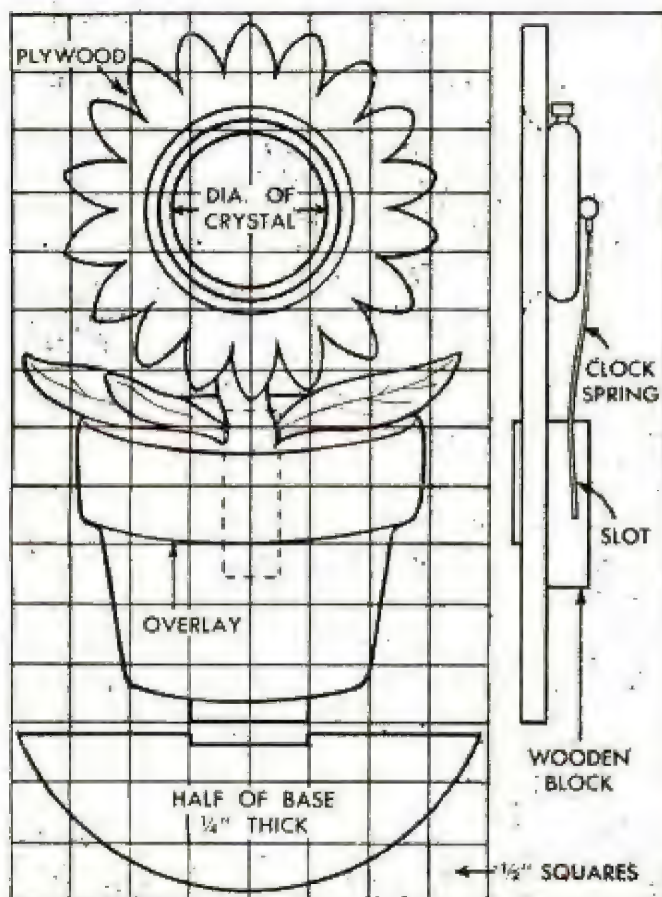
FLOWER CLOCK

By Richard Hanscom

JIGSAWED from plywood and fitted with an inexpensive pocket watch, this unusual flower clockcase is an attractive novelty for the children's room. First, cut out the flower and pot according to the squared pattern, making the center hole to suit the diameter of the watch crystal. If desired, each flower petal can be scooped slightly concave with a burr chucked in an electric hand grinder. The leaves are veined with a knife or razor blade, and a thin strip of veneer is added to the rim of the pot to give depth to the design. The cutout is mounted on an oval-shaped base by gluing the tenon at the bottom of the flowerpot in a slot in the center of the base. To permit easy removal of the watch for winding, it is held in place with a piece of clock spring, one end of which is inserted in a saw cut made in a wooden block glued to the back of the cutout. The entire unit is finished in bright colors, artist's oils being excellent for this purpose. Paint the leaves green and the pot brick red, using any appropriate color combination for the flower and base.



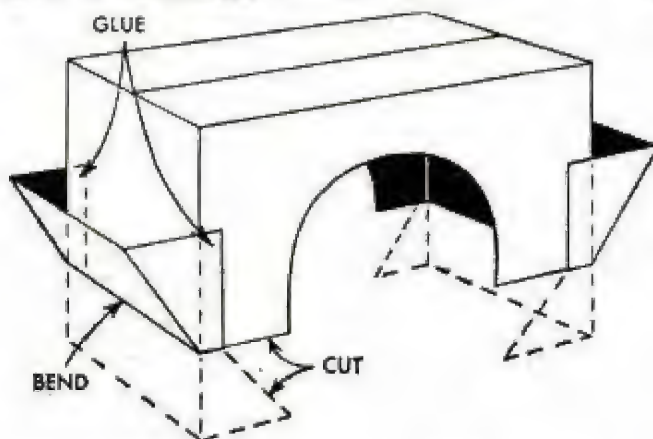
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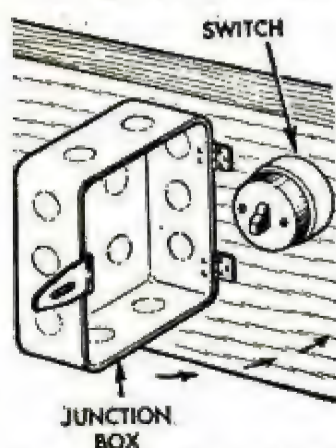


Cardboard Box Forms Bed Table For Convalescent Child

A small child confined to a sickbed for a few days will appreciate a play table made from a cardboard box. The bottom of the box forms the table top and the sides are arched so the box will fit over the child's legs. If the box is deep enough, the ends can be cut and bent upward, as shown, to provide pockets for toys and books. The table can be brightened by painting it and adding a rope handle to each end. The handles are both useful and decorative.

Mrs. Michael Fey, New York City.

Safety Cover Over Machine Switch



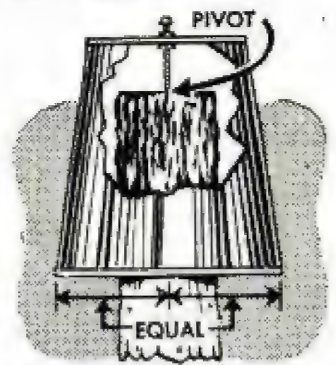
If you worry about the children turning on the power tools when you are not in the shop, cover the switch with a hinged junction box. Bolt or weld two hinges to one side of the box and fasten so it swings over the switch. Then fit a hasp to

the other side of the box to permit locking it with a padlock. Socket-head wood screws can be used to make removal of the cover more difficult.

S. S. Palestrant, Bronx, N. Y.

Wastebasket Serves as Plumb Bob When Setting Fence Posts

An old wastebasket, inverted and pivoted on a pointed stove bolt, substitutes for a plumb bob when setting fence posts. The bottom of the basket is drilled in the center for the bolt, which is fastened with a nut



on each side. To use, place the basket over the top of the post, centering the pivot as nearly as possible. The post will be vertical when the rim of the basket is the same distance from the center of the post in all directions. This can be noted by eye with sufficient accuracy.

Skis Held to Car-Top Carrier With Screen-Door Catches

Using screen-door catches to clamp skis and toboggans to car-top carriers permits loading and unloading in a fraction of the time ordinarily required to do the job. The equipment is held tightly on the carrier by the springs of the catches while rubber rollers protect it from being scratched or marred. The catches are fastened to the carrier units with screws. If they are positioned as shown, two pairs of skis and a toboggan may be carried but, of course, the arrangement can be varied to suit your particular needs.

Howard W. Squires, Virginia City, Nev.



5

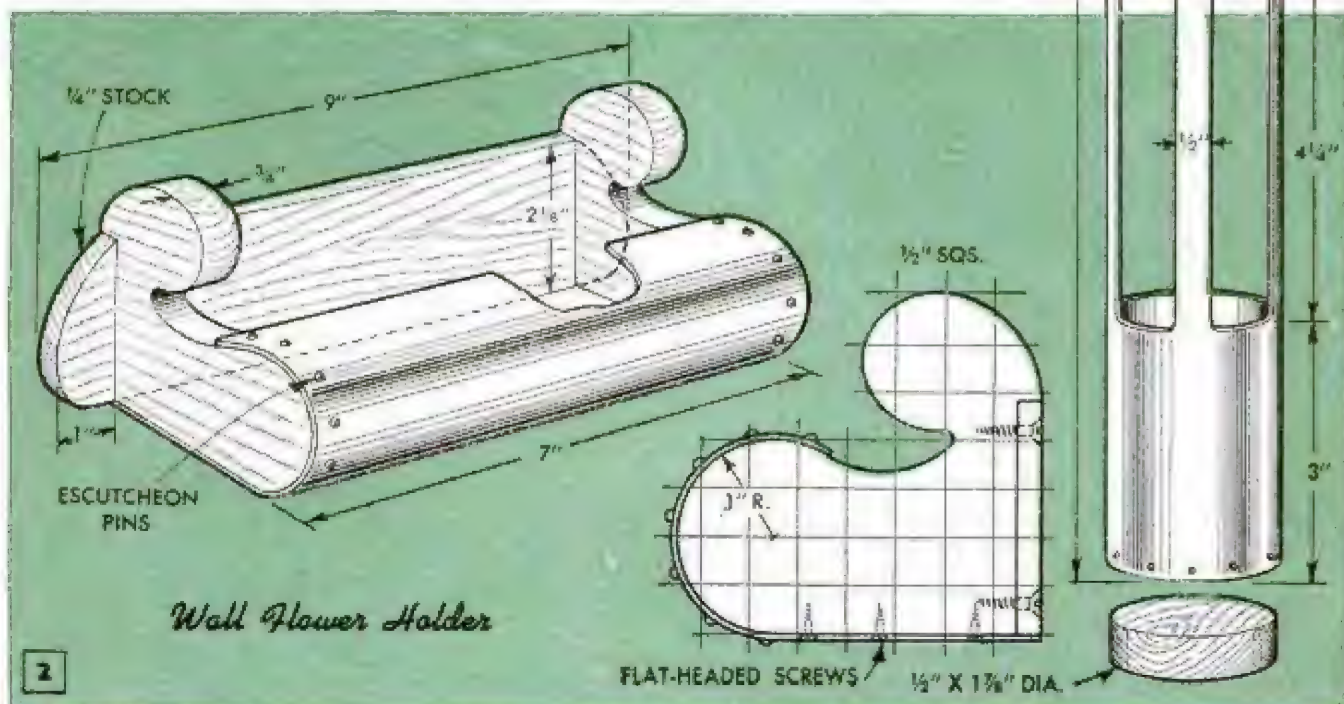
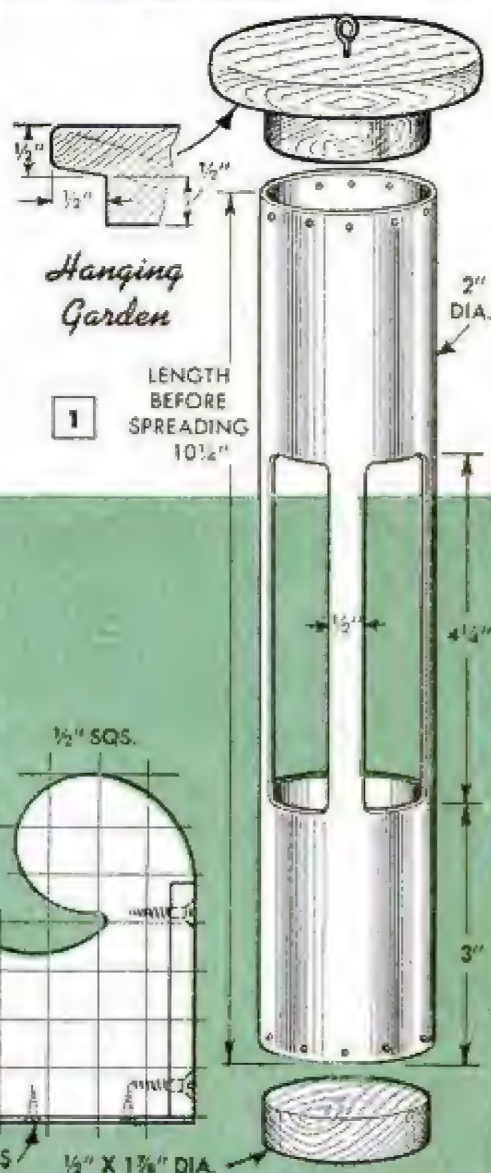
KWIKIE PROJECTS

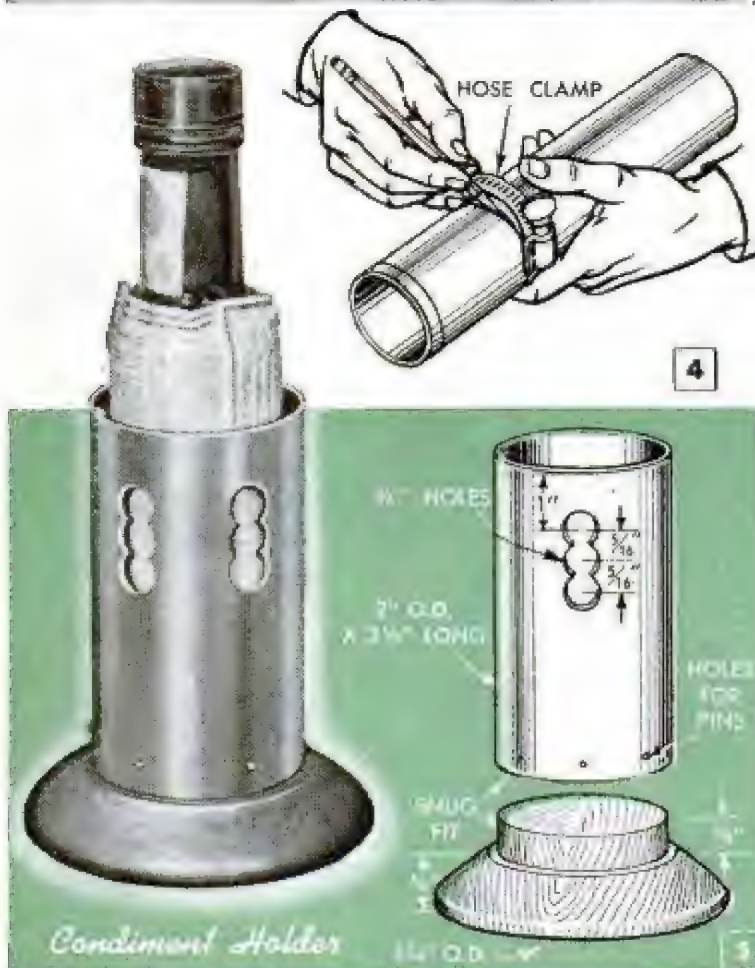
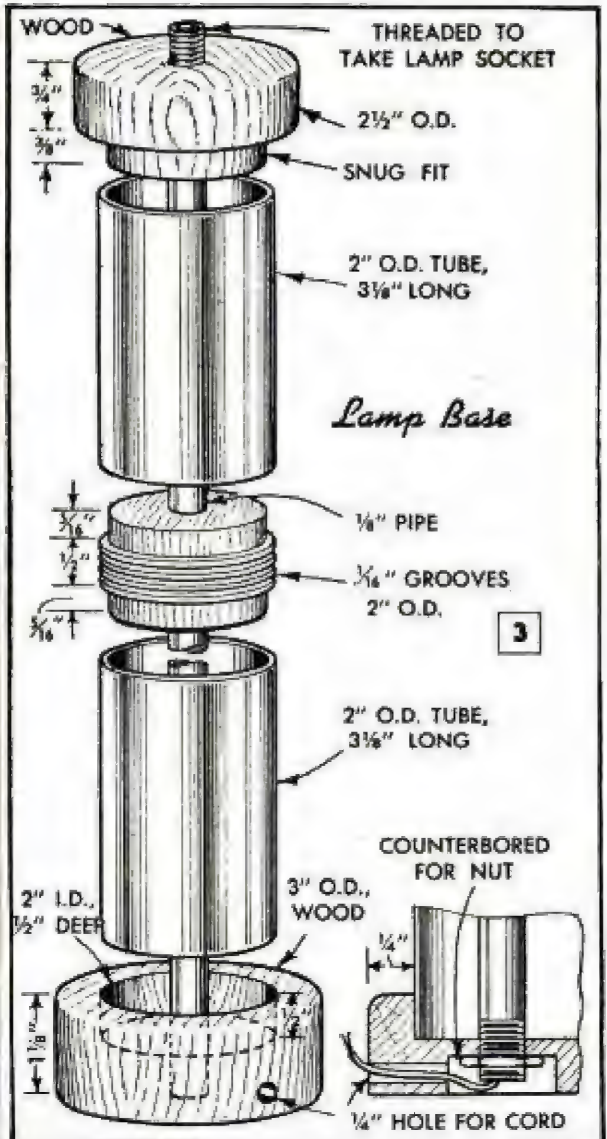
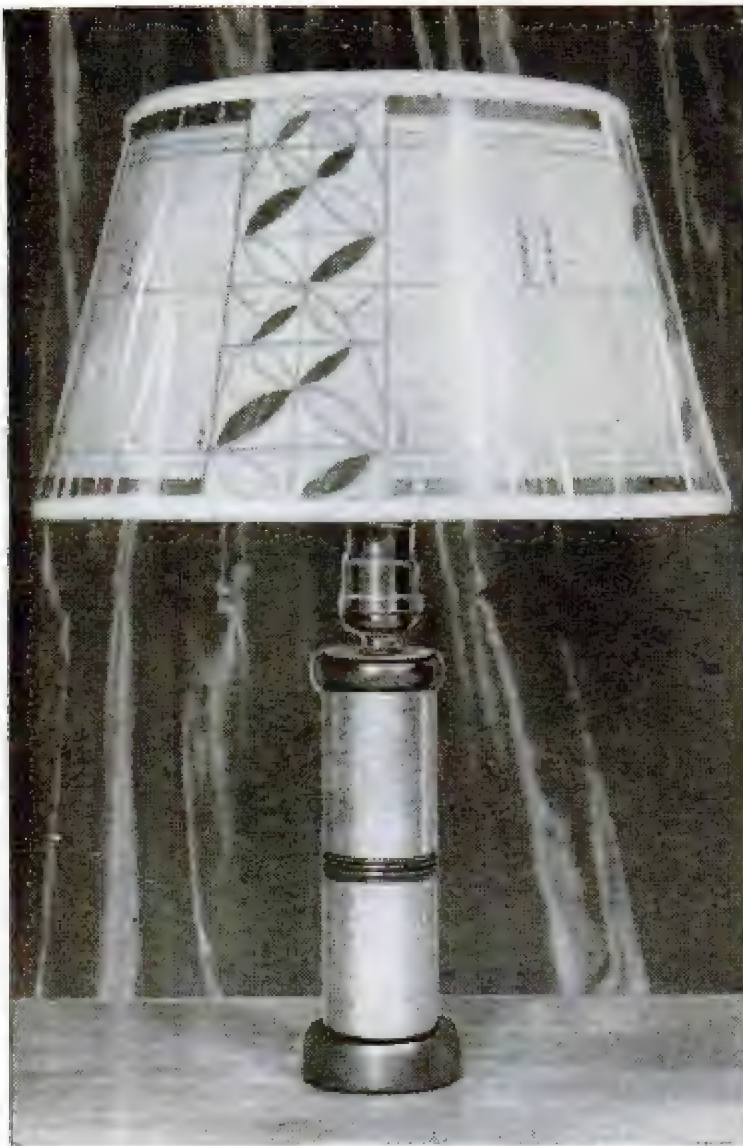
By R. J. DeCristoforo



ALUMINUM tubing is an excellent medium for quickly made, attractive projects. It is easy to work, readily available and inexpensive. Any one of these eye-catching items can be made in an evening.

An important thing to remember when working with aluminum tubing is to cut the end of the tubing perfectly square. This can be done by using a hose clamp as a marking guide, Fig. 4, cutting the tubing with a hacksaw and filing it to the guide line. If the aluminum is free from scratches, fine steel wool lubricated with a light oil will result in a good finish. Otherwise, use emery paper first and then finish with the steel wool. A fine "chrome" finish is obtained by buffing, and a satin finish may be put on



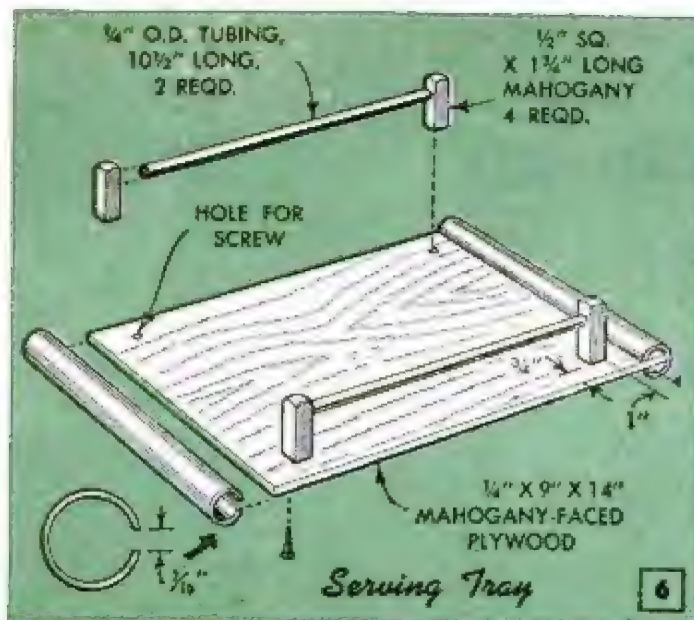


the tubing by using a wire brush.

Hanging garden: The tubing is cut to length and then cut out at the center as in Fig. 1. This can be done by drilling a hole in each corner of the cutout and sawing the tubing with a narrow hacksaw blade. Another way of cutting the openings is to slide the tubing over a piece of pipe and cut along the scribed lines with a small cold chisel. After this, the edges are smoothed with a fine file and the ribs in the cutout portion bent outward as shown in the photo. The wooden parts are turned, finished and attached to the tubing with escutcheon pins.

Wall flower holder: In this case, the tubing is slit lengthwise with a hacksaw. Then, approximately half the circumference is flattened by prying open the slit and hammering with a mallet. After the wooden parts are cut out and finished, the unit is assembled as shown in Fig. 2.

Lamp base: Construction of the lamp base is detailed in Fig. 3. Before assembly, the two pieces of tubing are slipped over a length of



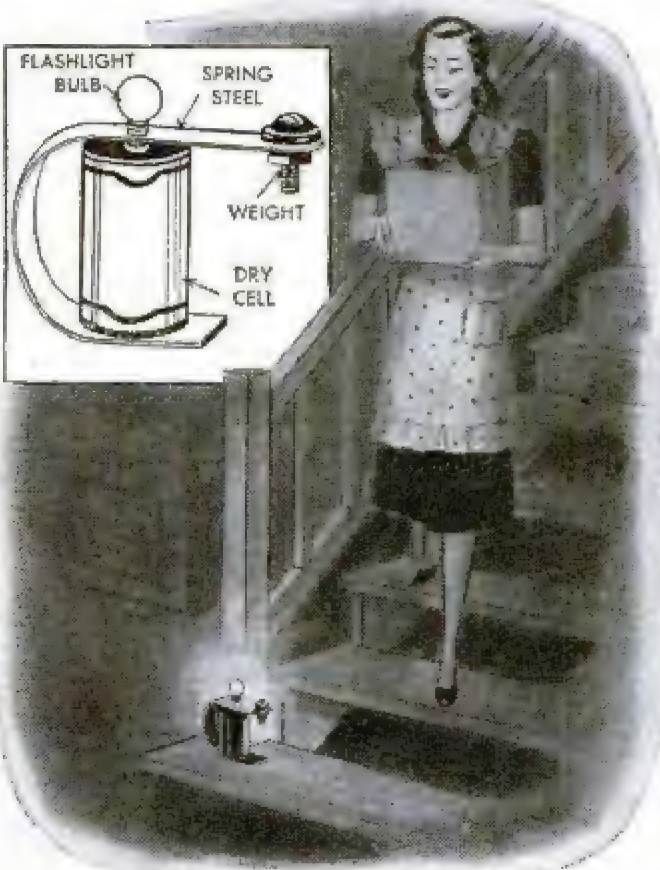
Attractive serving tray combines aluminum tubing with mahogany. Tubing is used to raise ends of tray and to provide decorative guardrails

bar stock or a piece of pipe and hammered with the rounded end of a ball-peen hammer. Wooden parts are turned carefully to size so the tubes fit them tightly. Note that the upper end of the $\frac{1}{8}$ -in. pipe is threaded for the lamp socket, and that the lower end is threaded for a nut which holds the assembly to the base. If desired, the diameter of the bottom wood turning can be made larger, or it can be weighted with lead.

Condiment holder: The decorative holes in the sides of the tubing, Fig. 5, are drilled with a $\frac{3}{8}$ -in. bit and the wooden base is attached with escutcheon pins. The top edge of the tubing may be scalloped, if preferred.

Serving tray: The tray, pictured in Fig. 7, is made as shown in Fig. 6. The lengths of

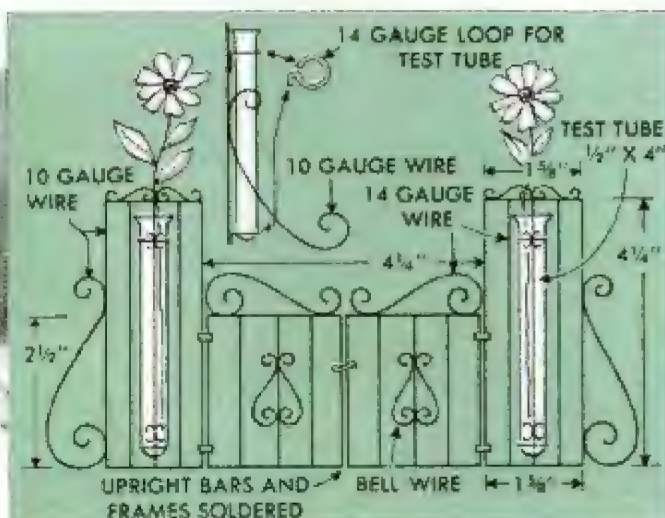
1-in. tubing used as endpieces are slotted to take the ends of the tray. This can be done by slitting the tubing and prying it apart $\frac{3}{16}$ in. to fit tightly over the $\frac{1}{4}$ -in. plywood. An easy way to slit the tubing is to break off the ends of a hacksaw blade and mount it in a block of wood. The tubing is held against a wooden strip which guides the block and the blade is run back and forth along the top of the tubing. A brad driven at each end of the tubing will serve as a stop to keep it from sliding and the fingers are used to keep it from rolling. Four posts are drilled to take the rails. They are fastened to the tray with countersunk flat-headed screws. The wooden parts should be varnished to protect them from spillage and to permit easy cleaning.



Vibrating Light Blinks Warning At Bottom of Dark Stairway

In homes where there is no electricity and a flight of stairs must be descended in darkness, this blinker will help prevent accidents if placed on the bottom step of the staircase. It serves as a warning light which, if critically adjusted, will blink at the slightest vibration, such as that caused by walking down the steps. To make the light, you will need a piece of spring steel, a small machine screw, a dry cell and a flashlight bulb. Bend the spring steel to a U-shape so that one leg is longer than the other and the distance between the legs is slightly greater than the length of the dry cell. Drill two holes in the long leg, one slightly undersize for a pen-type flashlight bulb (1.1-volt) and the other for a small machine screw which serves as a weight. Next, solder the short leg to the bottom of the dry cell, centering the hole for the bulb over the battery electrode. Some experimenting will be necessary to obtain a sensitive adjustment so the light will blink readily under the particular conditions.

Miniature Gateway Contains Twin Bud Vases



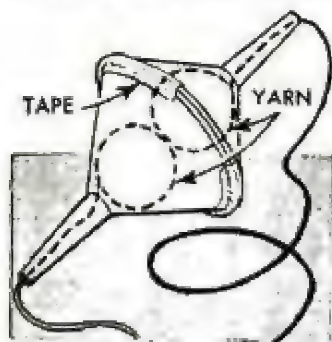
Made of wire and painted black to simulate wrought iron, this bud-vase holder is an attractive ornament for a mantel. Each gate and post frame is formed from one piece of wire soldered at a corner, and the other wire parts are soldered to the frames. Note that a large scroll at each end holds the unit upright. Test tubes serve as bud vases, and false gate hinges are made from strips of tin or copper.

Furnace Cement Kept From Crumbling by Reinforcing It With Steel Wool

When filling cracks with furnace cement, you can keep the cement from crumbling after it hardens by reinforcing it with coarse steel wool. Form the wool to the approximate size and shape of the crack and thoroughly work the cement into it. Then force the cement and wool into the crack with a screwdriver or putty knife.



Funnels Hold Two Balls of Yarn



Two funnels taped together provide an excellent holder which is especially useful when crocheting or knitting with yarn of two different colors as it keeps both balls of yarn running

smoothly. After placing a ball of yarn in each funnel and slipping the end through the spout, tape the funnels together.

Violet Brown Shay, New Orleans, La.

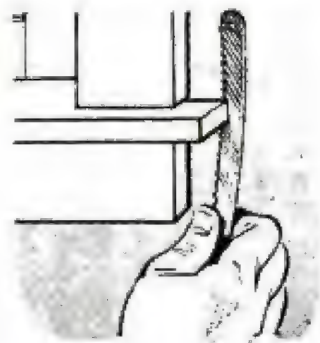
Moleskin Over Holster Fastener Protects Pistol Finish



If the snap fastener on a holster mars a pistol, stick a circular piece of moleskin adhesive over the back of the snap on the inside of the holster. The moleskin should be cut slightly larger than the snap.

Wallpapering Around Window Sill

To do a neater job and save time when wallpapering around window sills, use a hacksaw blade to make a saw cut between the projecting portions of the sill and the wall. Then the paper can be slipped behind the sill instead of being cut to fit around it. Be sure to hold the saw blade tightly against the wall while cutting.



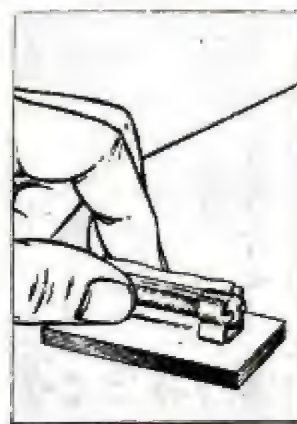
Richard I. Salzer, Baldwin, N. Y.

□ Glass tumblers can be separated by putting the bottom one in warm water and pouring cold water in the top one.

Checking the fuel line with a vacuum gauge may save unnecessary replacement of the fuel pump. Disconnect the fuel line at the pump and, with the engine idling, attach the vacuum gauge to the pump. Then, reconnect the fuel line and idle the engine to replace the gasoline in both pump and carburetor. Now, with the engine still idling, disconnect the fuel line at the gas tank and take a vacuum reading at this end of the line. If the latter reading is lower than the former, a defective fuel line is the cause of the trouble.



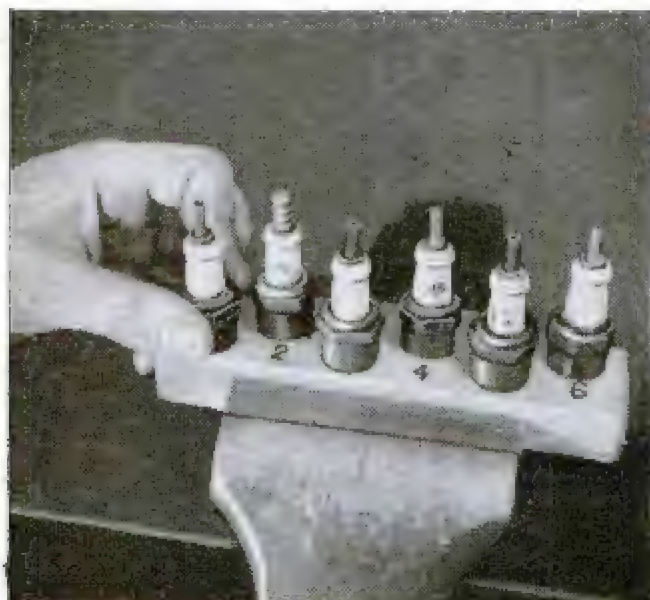
Sealing wax does an excellent job of repairing cracked or burned distributor caps. Hold the wax so it will drip into the area to be patched and melt it with a lighted match. When repairing charred spots, scrape burned surface clean before applying the wax.



If fuses blow mysteriously in your car, the trouble may be due to loose and corroded fuse clips. To correct this, wrap a piece of fine sandpaper around a fuse and rotate it gently in the clips. Then bend the clips inward in order to increase their tension.

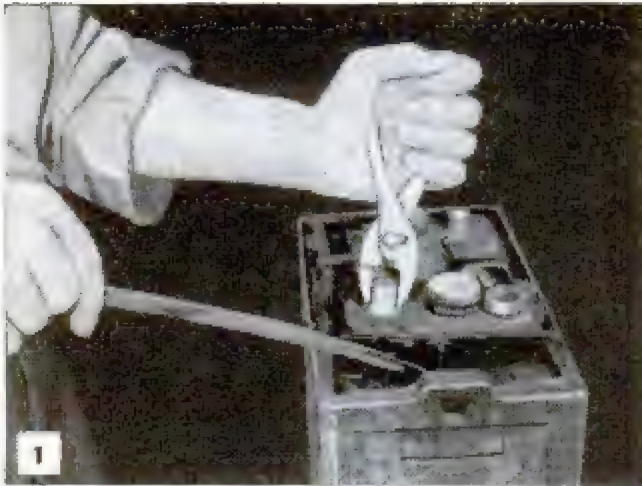
A **spark-plug rack** protects cleaned and regapped plugs from possible damage or upsetting of the gap. It consists of a series of holes drilled slightly oversize in a wooden block to take the threaded ends of the plugs. When the plugs are to be returned to the same cylinders, they can be kept in order by numbering the holes to correspond with the cylinders. If desired, the holes may be drilled undersize and tapped with the threads of an old spark plug.

Worn insulation on generator terminals is likely to result in their touching the housing. If the main terminal touches, the generator will stop charging and, if the field terminal touches, the generator may charge at such a high rate that it burns out. An easy way to remedy this is to fit two fiber bushings to each terminal, as shown. The shoulders of the bushings are the same diameter as the terminal hole and slightly less than half the thickness of the housing.



REJUVENATE YOUR BATTERY

By Ed Packer



1 Softening sealing compound with a heated screwdriver will free the cell so that it is easily removed. Be careful not to spill acid solution in the case



2 Replacing cracked or warped separators with new ones restores defective battery cell to continued use. Support the cell at an angle in the case as shown



3 Above, soldering the cell-connector strap after cutting to remove a cell. Below, sealing a repaired cell into the battery case with a hot soldering iron



DIFFICULT starting, more use of lights and accessories plus the tendency of a battery to lose its charge during cold weather make it difficult for an old battery to function satisfactorily during winter months. If you are having "cold weather" trouble with your battery, the most satisfactory solution to the problem is to replace it, but if you feel that you must get additional service from it, possibly a major operation on one or more of the cells will keep it out of the junk pile for a few more months.

The usual sign of impending failure is a low gravity reading in one cell. Prompt repair often will save a battery in this condition, unless the plates have become "mushy" due to fast and frequent charging. To repair the battery, the faulty cell must be removed from the case and opened. If an end cell is at fault, it will be necessary to cut only one connector in order to remove it, but if the center cell is the faulty one, both connectors must be cut. Do this with a hacksaw as in Fig. 6. Then, heat the blade of a screwdriver and use it to melt the sealing compound around the top of the cell cover as in Fig. 1. Grip the terminal post with pliers and lift the element carefully, tipping it at an angle as it is raised and resting it on the battery case as in Fig. 2. The most common cause of a low cell is one or more cracked, broken or rotted separators which allow the positive and negative plates to touch, thus short-circuiting the cell and discharging it. Other possible causes are the "bridging" of sediment across the plates and over the tops of the separators, and also sediment built up in the bottom of the cell to such a height that it connects the plates. If separators

Battered or worn terminal posts are built up with molten lead, using a form made of sheet aluminum. Photo shows post rebuilt and metal form removed



Regular gravity checks with a hydrometer, renewal of electrolyte and prompt repair of a low cell will add many months to the useful life of an old battery

are broken or otherwise damaged, simply replace them with new separators of the proper size and material. Scrape excess sediment from the plates with a softwood stick and remove sediment from the bottom of the cell with a wooden spoon. Then, lower the plate assembly, or element, back into the case, making sure that the element seats properly.

The meeting ends of the connector are filed to an angle of 45 deg. and the resulting vee is filled with lead melted into the joint with a hot soldering iron, Fig. 3. Reseal the cell cover by melting and running sealing compound into the joint with a soldering iron as in Fig. 4. *Caution:* Do not use an open flame to melt the sealing compound.

If the terminal posts of an old battery are battered or excessively worn, they should be built up to their original size and shape. Wrap the post with tape until its original diameter and taper are attained. Fit an aluminum collar, shown in Fig. 5, over the tape, binding it tightly with a piece of twisted wire. Then lift off the collar and strip off the tape. Replace the collar, centering it over the defective post where it serves as a form for retaining the molten lead, Fig. 7.

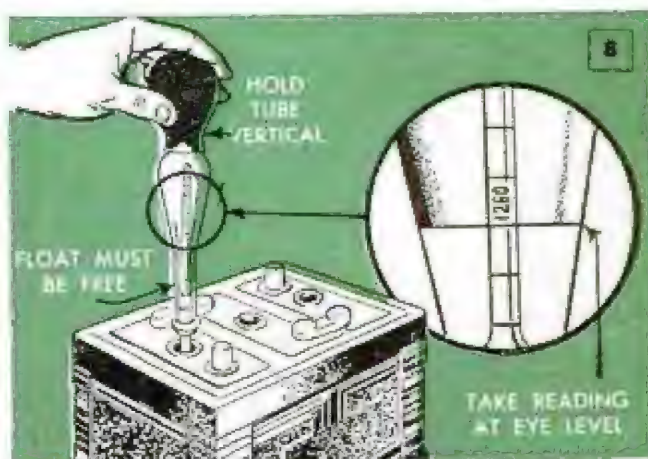
In a battery being repaired as described, there is an unknown amount of acid in the plates of the faulty cell. To equalize the solution, charge the battery until all cells are gassing freely and occasional checks with a hydrometer, used as in Fig. 8, show no rise in gravity over a period of four hours. This procedure assures that all the

To rebuild a worn post, wrap with tape to bring it to original size. Fit metal form over the tape and fasten with wire. Then remove form and the tape



acid is once more in solution. To balance the solution in the low cell, withdraw liquid with the hydrometer until the tops of the plates are exposed. Then add acid of 1.400 gravity to bring the level of the liquid to the proper height above the plates. Should it happen that the solution in the defective cell was at a low level to begin with and the subsequent hydrometer check shows the gravity to be high, add distilled water instead. After this adjustment of the solution, charging should be continued for at least 30 minutes to mix the new acid or water with the liquid already in the cell. The gravity is again read and adjusting continued until the reading is 1.280 or 1.300.

Keep a regular check on the battery solution with a hydrometer. In cold weather add water just before driving car so that water will mix with solution



Guard on Sewing Machine Prevents Injured Fingers



If your sewing machine has a spoked handwheel, facing the wheel with a cardboard guard will reduce the possibility of the children injuring their fingers. This also makes the machine safer for the operator. Just cut a cardboard disk to fit the wheel and tie it to the spokes with pieces of string or strong thread.

A. E. Fenn, Chicago.

41-51 Servicing Your Cigarette Lighter



When a cigarette lighter fails to ignite or burns with a low flame, try removing the cotton from the fluid container and fluffing it before replacing. This increases the fluid capacity of

the cotton and speeds up the rate of absorption by the wick, resulting in fast lighting and a steady flame.

C-Clamps Form Wheel Puller



Finding that a wheel puller was needed to force a pulley frozen on a motor shaft, I improvised one from two C-clamps, a piece of dowel and a small block of hardwood. After the parts are arranged as shown,

tightening both clamps simultaneously will remove the pulley without damaging the motor or shaft. Using two clamps of dif-

ferent sizes keeps the handles from interfering with each other.

Willard Allphin, Danvers, Mass.

Heating Lacquer Improves Spraying

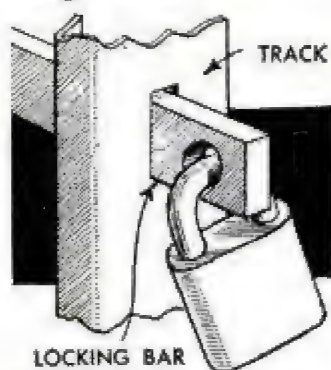
You will do a better job of lacquering if the lacquer in the spray gun is kept thin by warming it occasionally during the operation. Do this by immersing the spray-gun jar in a pan of hot water for a few minutes. Because of the inflammable nature of lacquer, be sure that the pan of water is not over an open flame while warming the gun.

Richard Hanscom, Elmhurst, Ill.



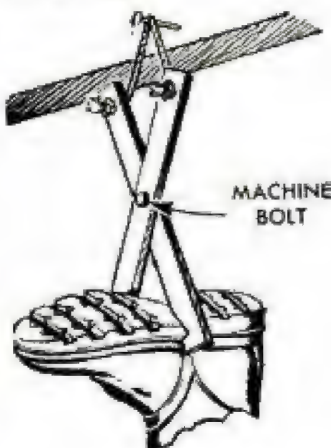
Inside Lock for Garage Door

As double protection for his car in case someone should gain entrance to the garage through the side door, one man padlocks the overhead door from the inside. He drilled a hole through the portion of the locking bar which projects through the track, and fastened a padlock at this point. This prevents the locking bar from being released.—Adolph Sprenzel, Chicago.



Hip Boots Hung by Tongs Are Kept From Cracking

To store rubber hip boots without danger of their becoming cracked at the knees, suspend them from the ceiling with these wooden tongs. The tongs are notched at one end to grip the sole of the boot, and joined at the center with a machine bolt. A length of cord is fastened between the ends opposite the notches so that when it is looped over a nail the weight of the boot causes the tongs to grip tightly.—Thomas E. Stimson, Jr., Los Angeles, Calif.



TEMPORARY LENS MOUNTINGS

By W. S. Kals

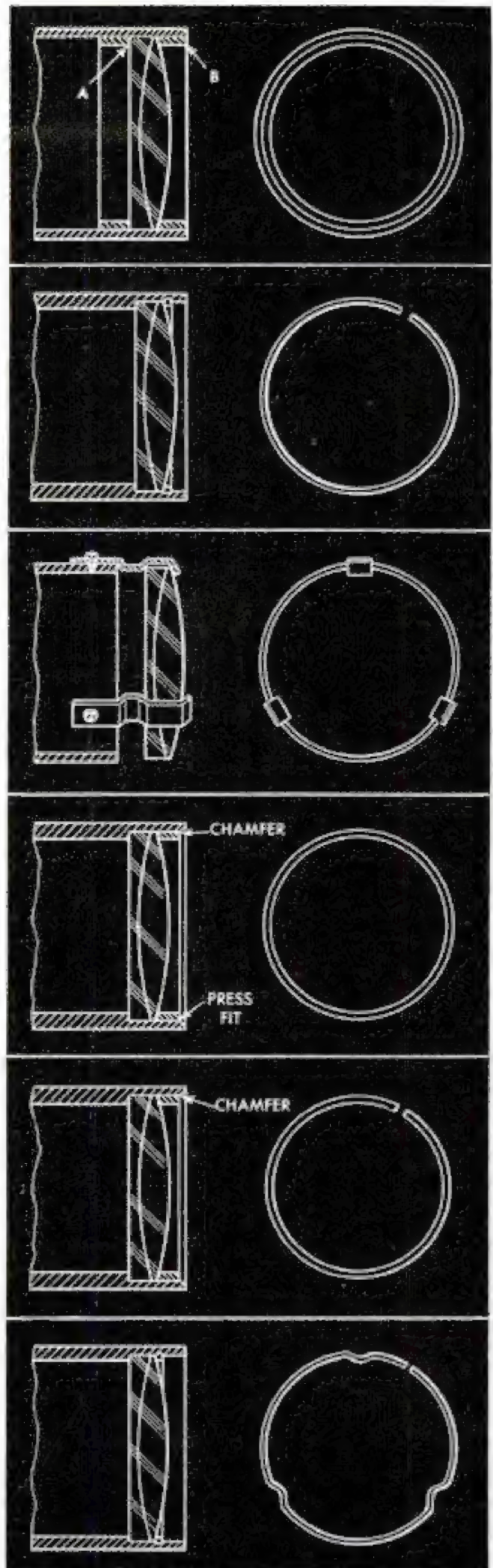
Upper right, a quick, easy way of mounting a lens for experimental work. Two cardboard tubes are selected, one with an inside diameter equal to that of the lens, the other of a size which will telescope firmly inside the first tube. Rings A and B are cut from the smaller and forced into the larger tube with the lens between. Right, a simple semipermanent mounting in a metal tube, making use of a split-wire retainer

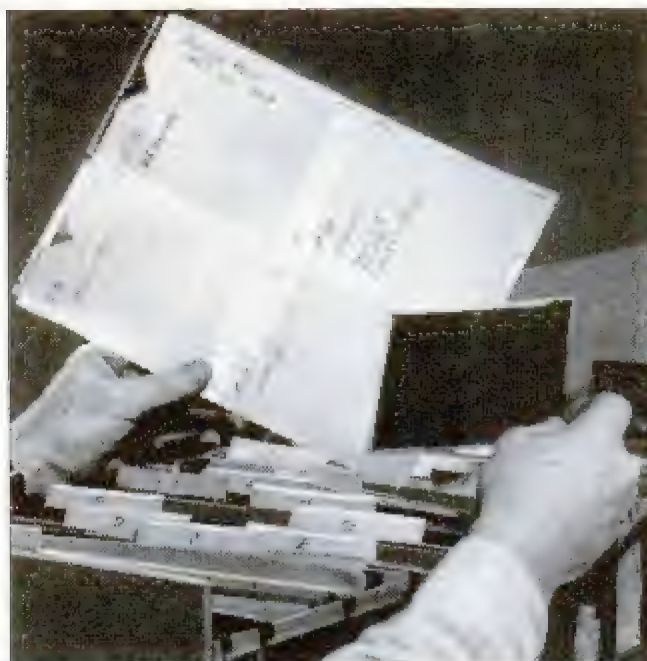
Lenses subjected to heat from a nearby light source should be spring-mounted in such a way that the glass is free to expand without danger of cracking. One of the simplest ways to do this is to support the lens in metal holders, or brackets, attached to the end of the tube with screws. In making this mounting, care should be taken to shape the holders in duplicate so that the lens will be held firmly

This mounting is similar to the cardboard mounting described above except that the metal tube is machined with a shoulder to provide a back support for the lens. The friction ring is machined to a press fit, and its inner edge is carefully beveled to fit the curve of the lens. The lens should fit in the shouldered portion of the tube with a slight amount of play to allow for possible expansion of the glass

This is a variation of the friction-ring mounting employing a flat, split ring as a retainer. The ring is machined to an outside diameter slightly greater than the inner diameter of the shouldered section of the tube. The ring is then split and a short section removed so that when compressed it is an easy fit in the shouldered end of the lens tube. Note also that the inner edge of the ring is beveled to fit lens

Another variation of the split-wire retainer especially suitable for holding lenses of large diameter. Three equally spaced bosses are formed in the wire ring with long-nosed pliers. The ring snaps into a semicircular groove machined in the shouldered portion of the tube. Special care must be taken when machining to locate this groove the correct distance from the shoulder so that, with the lens in position in the tube, the ring will bear against it lightly when it is snapped into place in the groove





Filing Envelopes for Negatives Are Sectioned With Staples

Two sheets of paper stapled together form a handy envelope for filing negatives either in a standard filing cabinet or in a Manila folder kept in a drawer. Arranging the staples to divide the envelope into a section for each negative keeps the negatives separated and permits writing pertinent information about each shot.

C. S. Matthews, Berkeley, Calif.

On-the-Spot Movie Titles Describe Travel Scenes

It is not necessary to spend time titling travel films after a trip if you shoot the title right through the car window as you begin taking the movies. Just write the title and other information on the window with lipstick and shoot it from the inside of the car. Then continue to shoot while someone rolls down the window achieving a fadeaway effect disclosing the scene. If you wish, shoot the scene first and then have someone roll up the window with the title.

Cards Aid Loading Film Tank



are turned off. The ends of the cards should project slightly so they will guide the film into the slots.

When loading a cut-film tank in the darkroom, the annoyance of trying to work the end of the film into the proper slot is eliminated by inserting small filing cards in the reel before the lights

Mounting Photofloods Overhead

Instead of turning a reflector photoflood directly into a ceiling outlet for overhead lighting, you can fit the outlet with a swivel joint simply by turning two double sockets into it before inserting the lamp. This permits the light to be focused at a variety of angles, allowing the shot to be taken in any part of the room rather than only under the outlet. Additional variation of angles can be had by loosening the sockets slightly.

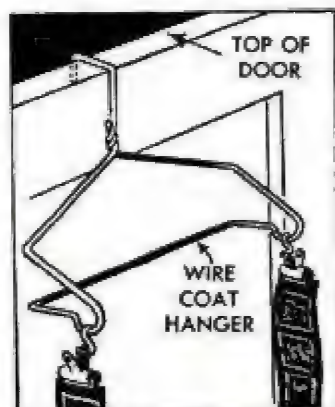
Wallace H. McClay, Pasadena, Calif.



Drying Rack From Coat Hanger

An ordinary wire coat hanger provides a handy rack for drying roll film. The hook part of the hanger is bent to fit over the top of a door and the arms are bent outward as shown. When the film is hung at the ends of the arms, it is held several inches away from the door so that it is not likely to be damaged.

Harry Radzinsky, Great Neck, L. I.



Flasher Times Enlargements

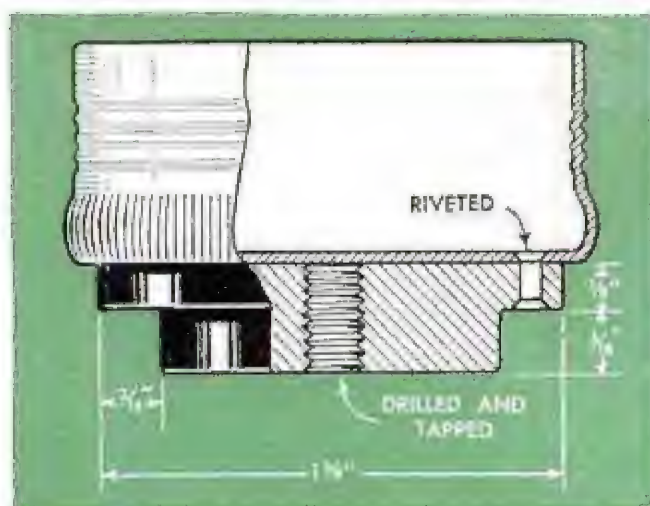
Timing enlargements is simply a matter of counting the flashes of the enlarger lamp if an ordinary flasher button is inserted in the lamp socket. Count the number of flashes required to produce a satisfactory test strip and then repeat this number for subsequent prints.

Another advantage is that the negative remains cooler during long exposures. Be sure that the capacity of the flasher is sufficient to handle the bulb to be used.

R. F. Donovan, Jersey City, N. J.



Tripod Adapter Supports Booster Flash.



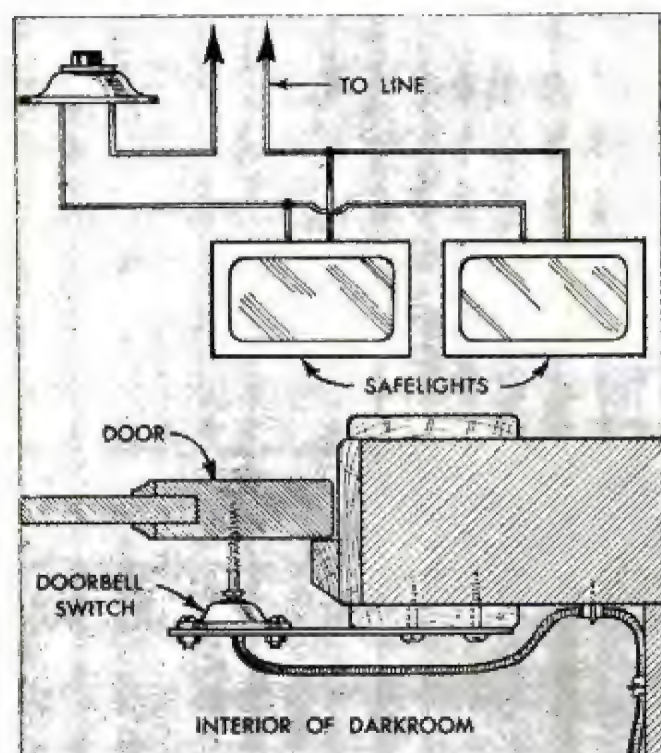
One three-cell flash gun may be too weak to flash several auxiliary lights placed a considerable distance from the camera. In such cases, it is not always satisfactory to clamp a second flash gun, used as a booster, to a tripod or light stand by means of the bracket furnished. This is due to the fact that the gun frequently tends to tilt forward, making it difficult to keep the light directed where desired. However, this little adapter will solve the problem in a jiffy. It's nothing more than a turned flange, drilled and tapped for the tripod screw and riveted to the end cap of the battery case.



Equipped in this way, a flash gun can be screwed on any standard tripod with or without a pan head or tilt top. In addition, it can be mounted on an ordinary light stand by turning it on a stud having a threaded tip.—Ed Mogridge, Omaha, Neb.

Switch Mounted on Door Casing Operates Safelights in Darkroom

If the safelights in your darkroom have been left burning all night, resulting in the overheating and ruining of their gelatin screen, you will appreciate this safelight



switch. It turns on the lights when the darkroom door is closed and turns them off when the door is open. An ordinary doorbell switch is wired into the safelight circuit and fastened to a flat-iron bracket. The bracket is screwed to the casing to hold the switch in front of the door. It should, of course, be located near the top of the door and out of the way. Then a long wood screw is driven into the door so that it will depress the switch button when the door is closed.

Arthur Trauffer, Council Bluffs, Iowa.

Sprayer for Ferrotpe Solution

An even coat of ferrotpe solution is easily applied to plates if sprayed on with an atomizer from a bottle of window cleaner. Window-cleaner bottle cap and atomizer will fit most ferrotpe solution bottles.



Easy Method of Filtering Photo Solutions Works Automatically and Helps Save Time



The following method saves time and eliminates spillage when filtering large quantities of photo solution. Select a cork to fit a gallon bottle, drill a hole through it to take the spout of a funnel, and slit one side for a breather. Then pour the solution into a widemouthed jar. Insert the cork and funnel in the neck of the bottle and place a large wad of cotton in the funnel. Turn the funnel and bottle upside down over the jar and, finally, invert the whole assembly. It will stand upright and the filtering process will continue without requiring further attention.

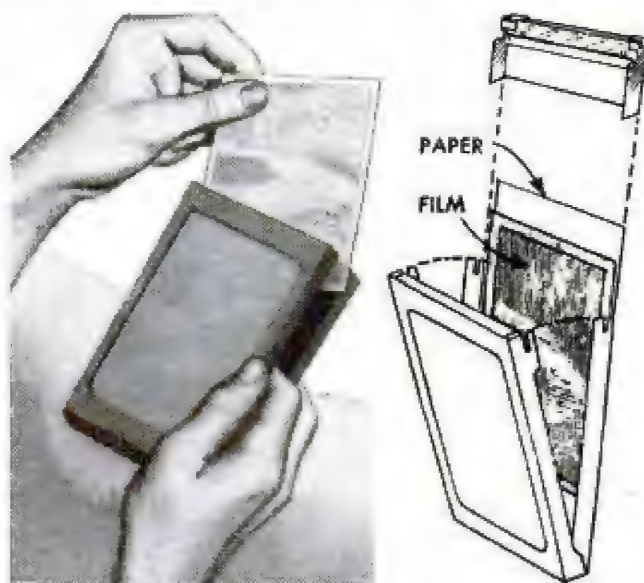
Empty Cut-Film Packs Provide Convenient Filing Cases for Negatives

Empty film-pack containers, that are usually discarded, make ideal dustproof filing cases for negatives. A paper separator is inserted between the negatives to protect the film and also to provide space to record pertinent data for each negative. A label on the pack lists the contents.

Norman Sklarewitz, Bloomington, Ind.

Novel Silhouettes From Negatives

Fairly thin negatives can be made into interesting pictures having a silhouette appearance. To do this, soak the negative in a solution of bichloride of mercury. This will turn the black portion of the negative a metallic white. After washing and drying the negative, coat the emulsion side with black paint and mount in a suitable frame. *Caution:* Bichloride of mercury is poisonous. It should be handled carefully.



Cloth Sleeve Cleans Lenses



Passing a lens or filter through a flat sleeve of heavy, soft cloth cleans both sides of the disk at one time. The edges of the cloth are sewed or cemented together to form the sleeve which can be stored in a corner of the auxiliary-lens case.

Ash Tray Forms Camera Stand

If your camera is the type that cannot be set upright when the flash synchronizer is attached, bolt a small metal ash tray upside-down to the underside of the synchronizer bracket. This will keep the camera from tipping over and possibly bending the cable release or other attachments. A nickel or chrome-plated tray will add to the appearance of the camera. — Kenneth Murray, Colon, Mich.





Build your own TOOL-POST TURRET

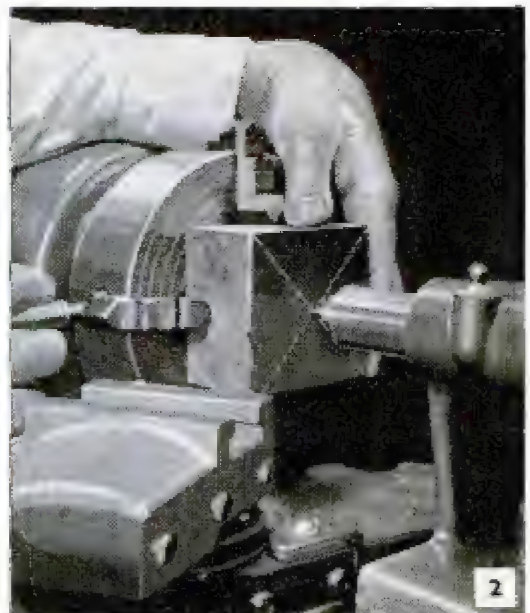
By E. M. HANSON

DESIGNED for lathes of the 9 and 10-in. swing sizes, this tool-post turret makes four different cutting tools instantly available without changing cutting bits or toolholders. The only power tools needed to make the turret are the lathe on which the turret is to be used and a drill press.

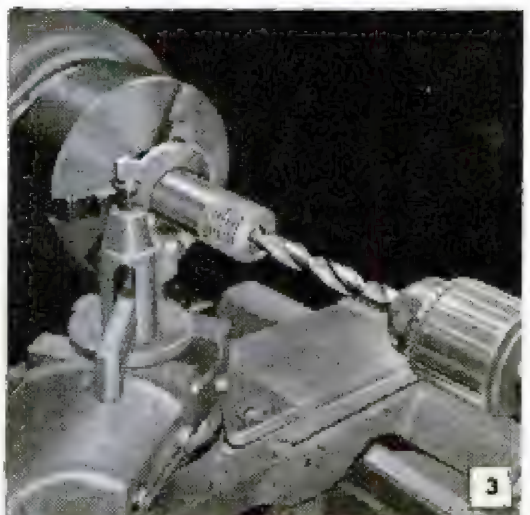
For the turret body, use a 2 x 3 x 3-in. block of cold-rolled steel. First, find the center of a 3 x 3-in. side by scribing diagonal lines as in Fig. 1. Then, center-punch the intersection of the lines and center the block in a four-jaw chuck by aligning the punch mark with the lathe tailstock center as in Fig. 2. Face off the end of the block and, referring to the dimensions given in Fig. 5, drill and bore a hole through the center and counterbore to the tolerances indicated. Then rechuck the work end-for-end to turn the other side. Put the block aside at this stage and chuck a piece of $2\frac{5}{8}$ -in.-dia. stock, $3\frac{5}{8}$ in. long, for the center post, Fig. 4. First, face off the end and turn down the stock to 1-in. dia. for a



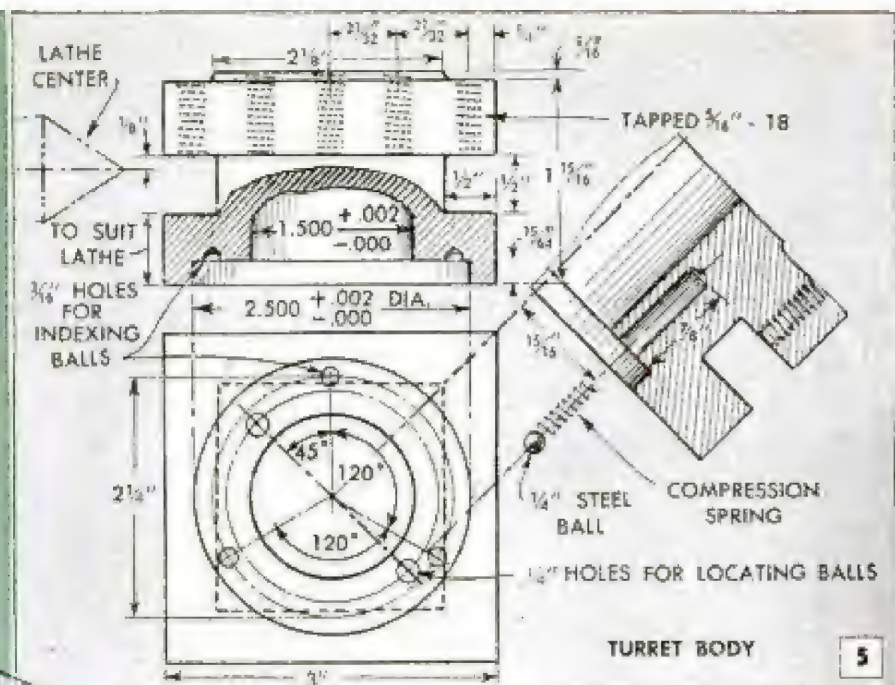
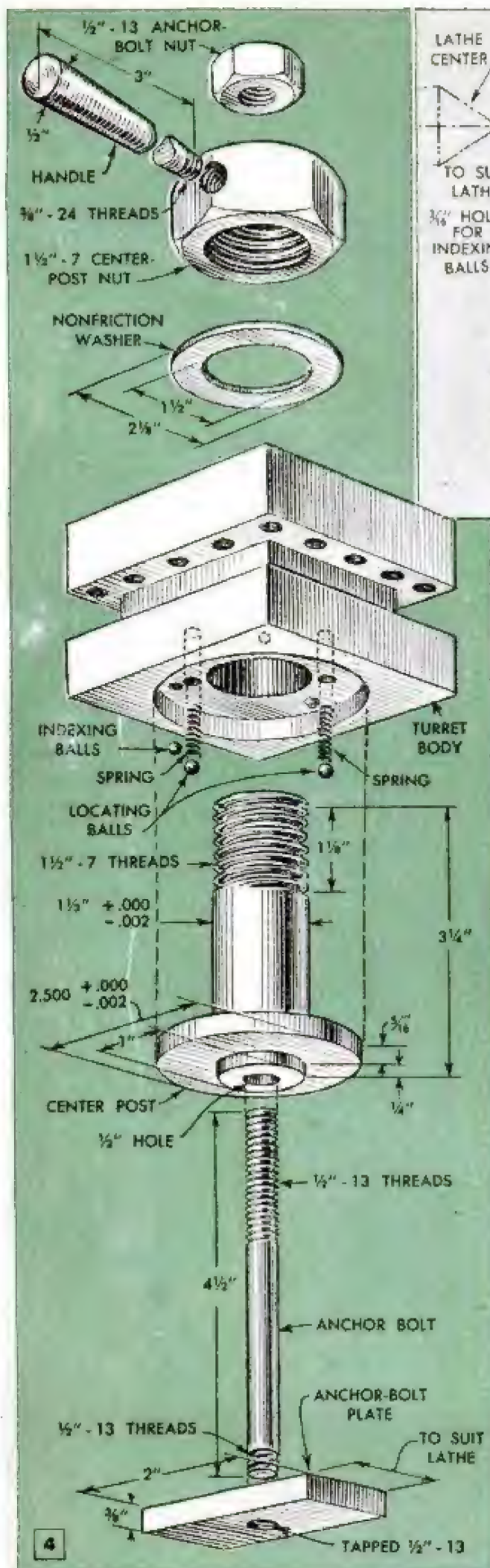
Scribing diagonal lines across corners of the tool-post turret block to locate center



Block is centered in chuck by aligning center-punch mark with tailstock center



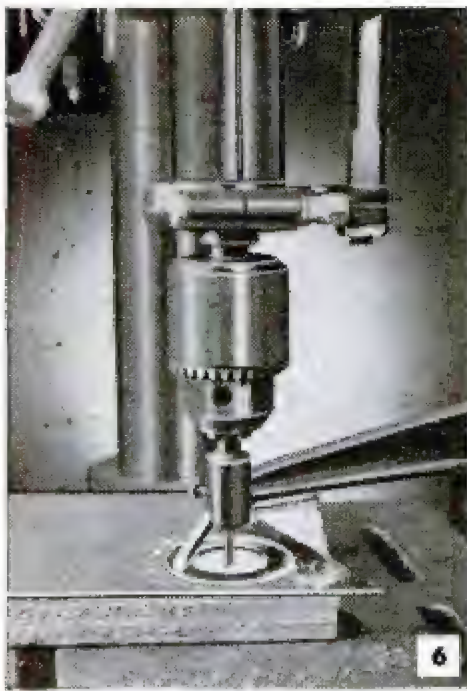
Drilling hole through center post. Drill chuck is held in ram of tailstock center



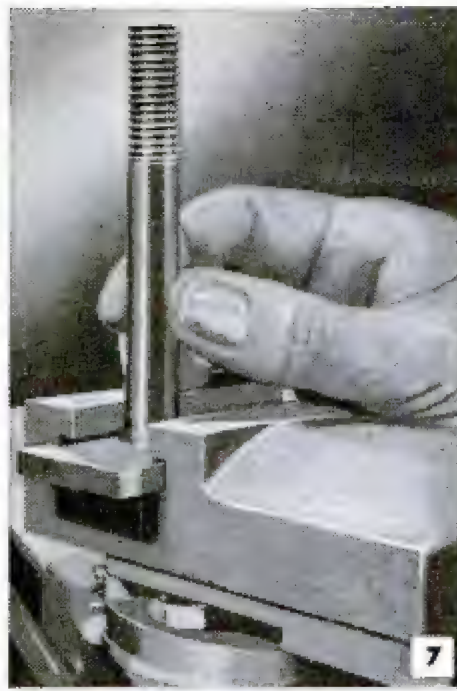
distance of 1/2 in. from the end. Then remove the piece, chuck the turned portion, and face off the other end to a distance of 3 in. from the shouldered edge. This end should be center-drilled so the tailstock center can be used when turning down the piece to 1 1/2 in. in dia., 3/16 in. from the shouldered edge. The piece is then threaded for a 1 1/2-7 hexagon nut. Before removing the work from the lathe chuck, release the tailstock center and try the turret body and nut for fit. Now drill a 1/2-in. hole through the center as shown in Fig. 3. To finish the center post, again rechuck it end-for-end and face off the 1-in.-dia. portion to 1/4 in. from the shouldered edge.

The center-post nut, Fig. 4, is drilled and tapped to take a handle. To start the drill, file a flat on one of the six corners of the nut. Center-punch and drill and tap at about a 15-deg. angle so the handle will tilt upwards as shown in Fig. 9. The handle is made of 1/2-in.-dia. cold-rolled steel taper-turned to 3/8 in. at one end and threaded as indicated in Fig. 4. The nonfriction washer, Fig. 4, is cut from sheet brass with a circle cutter as shown in Fig. 6. A 1/2-in. steel rod for an anchor bolt is threaded on both ends to take a standard 1/2-in. nut and anchor-bolt plate which fits into the T-slot of the lathe compound rest as in Fig. 7.

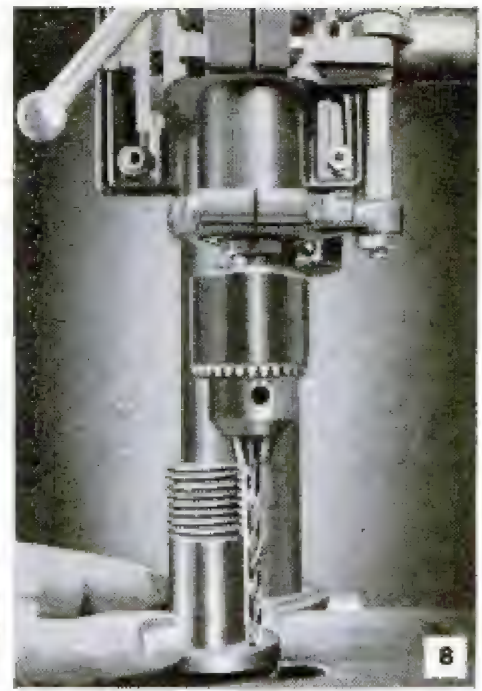
The turret body, which was previously set aside, must be drilled for the two 1/4-in. locating balls and three indexing balls, Fig. 4. Referring to Fig. 5, drill two holes 180 deg. apart for the 1/4-in. locating balls and springs. Use a drill one size larger than the balls to permit them to move freely in the holes. Then, 45 deg. from one of the 1/4-in. holes and on a 2 1/4-in. circle, drill another hole 3/32 in. deep with a No.



6



7



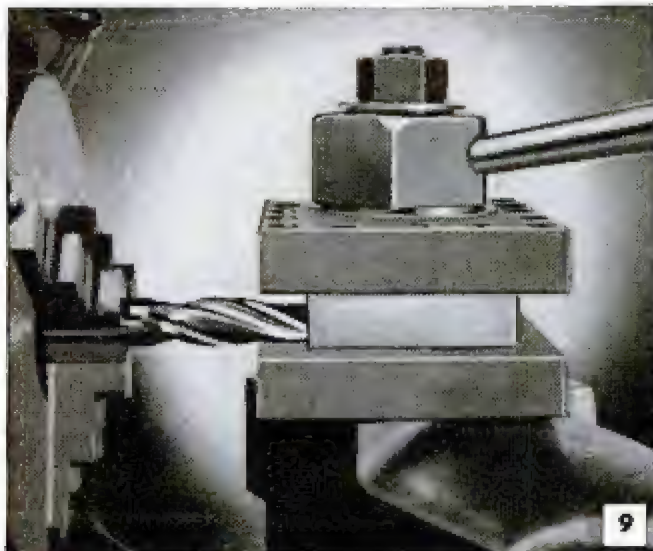
8

13 drill. Lay out the positions for the other two holes 120 deg. from the first hole. When drilling, have the drill-press gauge at exactly the same setting as for drilling the first hole. As these holes are slightly smaller than the $\frac{3}{16}$ -in. balls, use a piece of brass to avoid making a flat spot on the balls when driving them in place. With the five balls in their respective holes, coat with light grease the surface of the center-post base that will contact the balls when it is assembled with the turret body. When assembled, rotate the center post one complete revolution. This will leave a circular line on the base that can be easily seen when it is removed. Lay out and center-punch four equally spaced positions on the line made by the $\frac{1}{4}$ -in. balls, and drill four holes $\frac{1}{32}$ in. deep with a $\frac{1}{4}$ -in. drill as in Fig. 8. These holes are used for locating and retaining the turret body. Accurate indexing, to virtually zero percentage of error, is accomplished by making impressions on the base of the center post for the

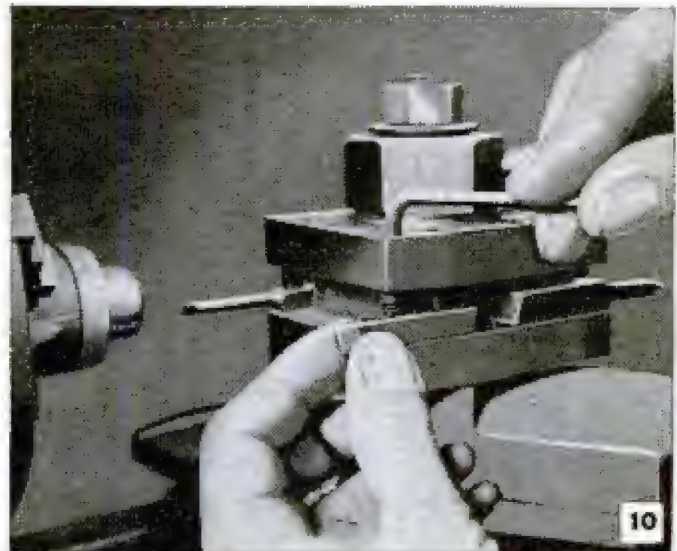
$\frac{3}{16}$ -in. balls. To achieve this accuracy, re-assemble the turret body and center post, aligning the $\frac{1}{4}$ -in. balls with two of the holes in the base, and tighten the center-post nut. Then, with the center post resting on a solid base, tap the four corners of the turret body with a brass or lead hammer so the $\frac{3}{16}$ -in. balls will make an impression on the center-post base. Repeat this process at each quarter turn of the turret body.

To support the cutting tools, a $\frac{1}{2}$ -in. groove is milled all around the turret body with an end mill as in Fig. 9. Note in Fig. 5 that the top surface of the groove is $\frac{1}{8}$ in. above the lathe center. The top of the turret body is then drilled and tapped for 16 setscrews as indicated in Fig. 5. The cutting bits are placed at the desired height by use of shims and are held firmly in place with socket-head setscrews as in Fig. 10.

In use, to switch from one tool to another, loosen the center-post nut about a quarter turn, rotate the turret to the desired position, and tighten the nut.

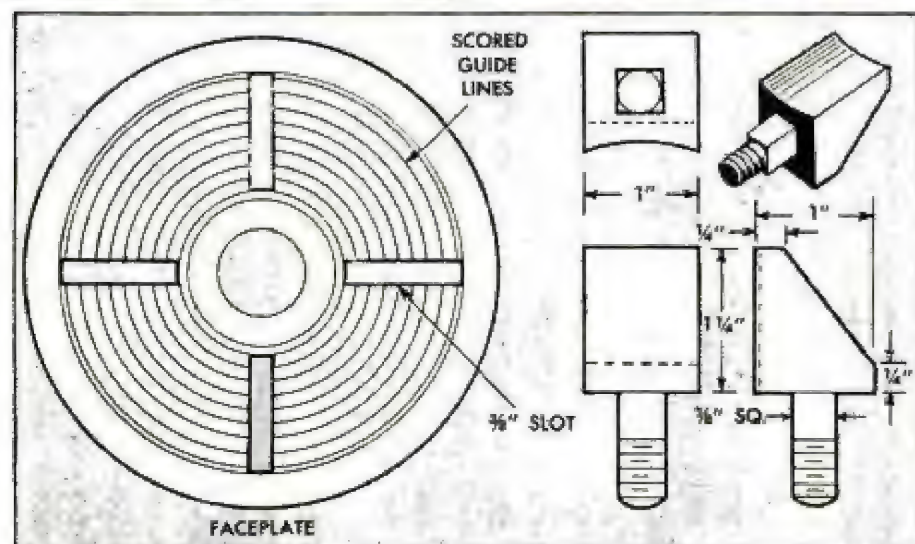
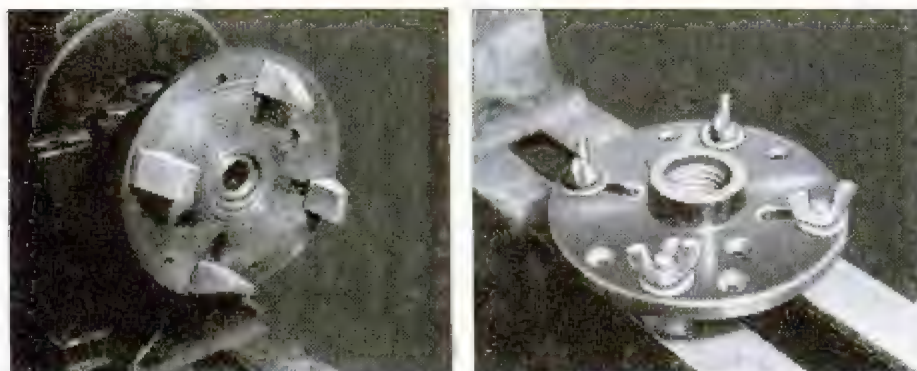


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10

Faceplate Converted to Lathe Chuck By Addition of Jaws and Guide Lines



By converting a wood-lathe faceplate to a four-jaw chuck, it is no longer necessary to make a wooden chuck for each special turning job. In addition, the jaws can be removed when they are not needed. Slots for the jaws are formed in the faceplate at right angles to each other by drilling rows of holes and filing out the waste stock. To aid in centering the work, concentric guide lines are scored on the plate at $\frac{1}{8}$ -in. intervals. The jaws, made as shown in the detail, are of cold-rolled steel and are held in the slots with wing nuts. Note that the faces of the jaws are concave. As the concave is not critical, this can be done on a tool grinder. In order to protect the work, the face of each jaw is padded with a piece of rubber cemented in place.—D. C. Marshall, Manhattan, Kans.

Plate Glass Faced With Emery Cloth Provides Inexpensive Lapping Plate

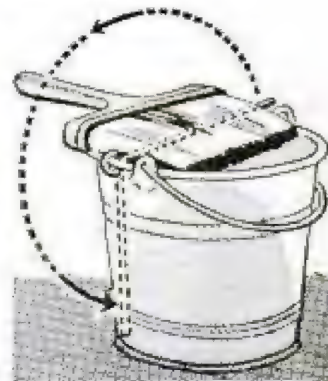
Faced with emery cloth, a piece of heavy plate glass serves as an inexpensive lapping plate. Although it cannot be used for extreme accuracy, it does a good job where a reasonably smooth, flat surface is required. Use water glass (sodium silicate) to cement the cloth to the plate as this permits the cloth to be removed with warm water when it becomes worn. Spread the water glass on the back of the cloth with a spatula or putty knife. Then smooth the

cloth to the glass with a photoprint roller and allow to dry for 20 minutes. To use, lay the plate on a flat surface about waist high. Holding the work firmly, slide it back and forth or in a circular motion, applying very light pressure. The trick is to change the direction of motion continually in order to attain a matte finish as well as a flat surface. If the new abrasive cuts too rapidly, rub chalk over the grit. When the abrasive begins to wear smooth, flood it with lard oil. The most positive action is reached when the abrasive appears to be gone and the work is sliding in an oily slush.—Alexander Maxwell, Chicago.



Brush Holder for Paste Pail

Made from a length of stiff wire pivoted to lie across a paste pail, this brush holder swings out of the way to permit mixing the paste. Drill a hole for the wire through the side of the pail just under the rim.



Submersible Element Heats Water Quickly

In either a home or shop where a constant supply of hot water is not available, a submersible heating element is just the thing to heat a pan or bucket of water in a jiffy. It consists fundamentally of a 500-watt, cone-type heating element enclosed in a watertight container. To make one, obtain a screw-top can having an inside diameter larger than the diameter of the heating element. Be sure that the element does not touch the sides of the can. Allow $\frac{1}{4}$ -in. clearance all around. Then, solder two pieces of wire to the bottom of the can to hold a metal weight necessary to keep the heater submerged. The heating element is turned into a porcelain socket bolted to the cap of the can. An extension cord from the socket runs through a short length of tubing threaded at one end and fastened to the cap with two nuts. The extension cord is tightly wrapped with asbestos paper for several inches back from the socket in order to minimize heat damage to the insulation of the cord. Note that two heatproof gaskets are inserted in the underside of the cap before the parts are assembled. A shallow groove is made



around the tubing near its upper end and a length of rubber hose is clamped to the tube by twisting a piece of wire around it at this point. The hose should extend well above the water level. When the assembly has been completed, test it for leaks before turning on the current.

C. L. Meehan, Lakeview, Ont., Can.



Scale Scribed on Triangle Aids Setting Dividers

Dividers can be quickly set from .01 in. to 1 in. by means of this 1-in. square scribed on the face of a triangle. Carefully lay out the square and divide it into ten equal parts vertically and horizontally. Then scribe a diagonal from one lower corner to the first vertical tenth line at the top of the square. The proper dimension is obtained by positioning the dividers between the tenth lines and the diagonal.

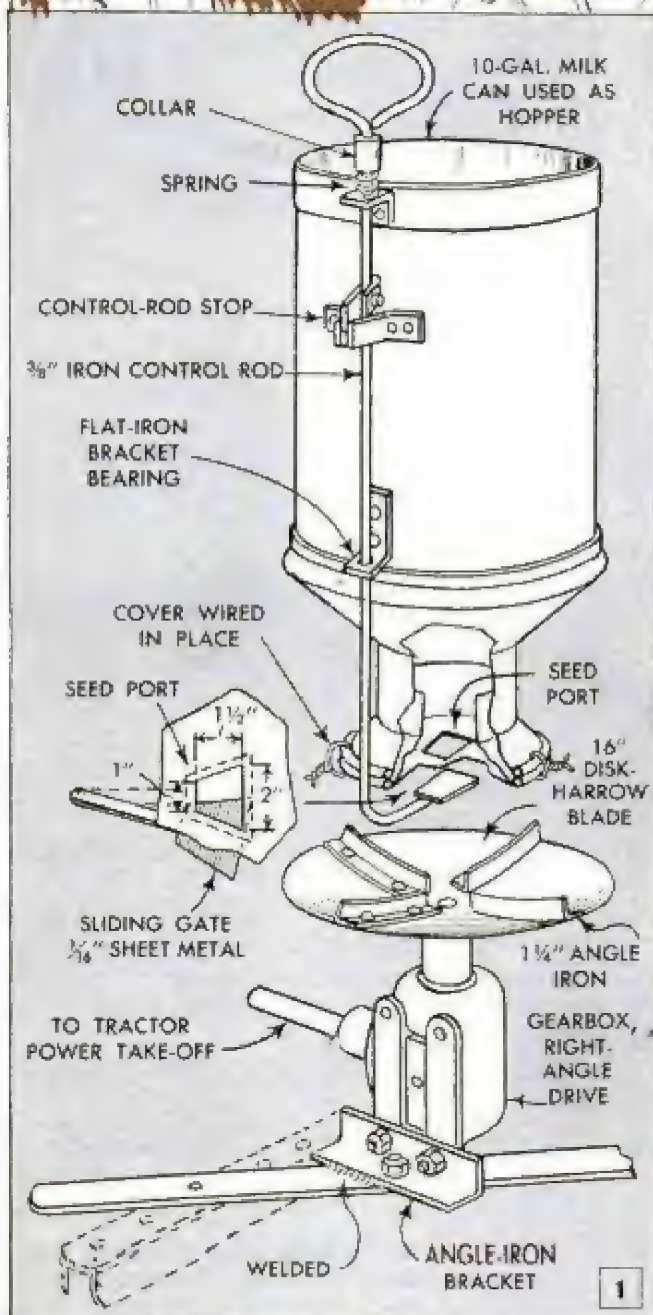
Iver Johnsen, Jr., Michigan City, Ind.

☛ To be sure that a gear cutter is centered directly over the dividing-head centers, mount a piece of scrap stock on an arbor between centers. Take a trial cut and then turn the stock end-for-end. If the cutter is centered, it will fit in the slot.

BROADCAST SEEDER MOUNTS



By Simon M. Schwartz

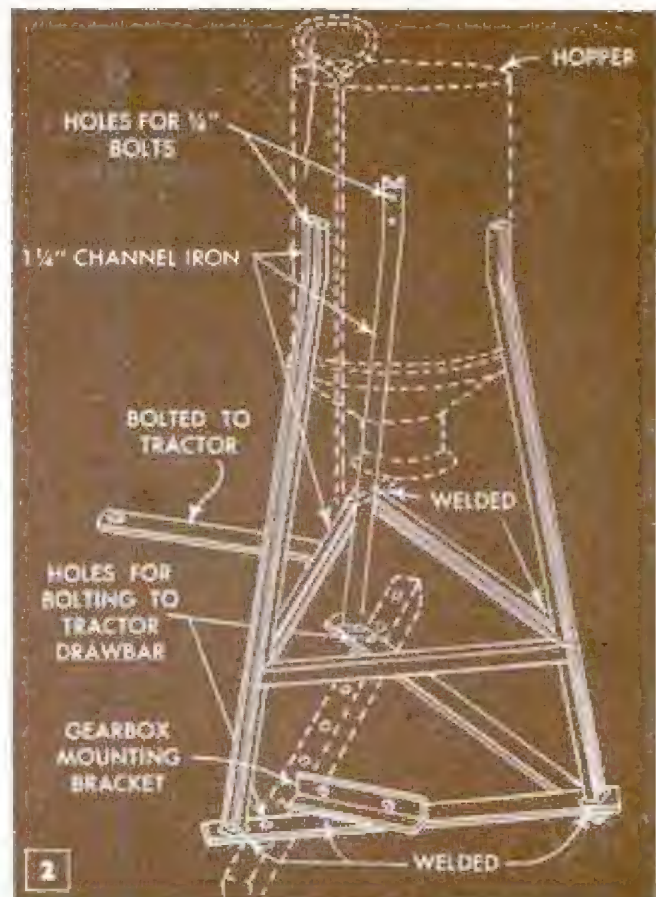


THIS EFFICIENT broadcast seeder was built by Frank Signs of Indiana for the special purpose of seeding a cover crop in growing corn at the time of the last cultivation. The seeder handles any of the common clover seed as well as rye, wheat and oats. When seeding in corn, a width of nine corn rows is covered on each trip across the field. The seeding rate is adjusted by means of a movable gate which slides across a seed port. An adjustable stop on the control rod permits the gate to be set to sow any amount of seed up to the full capacity of the seed-port opening. The stop also assures that the gate will be returned to the same position when the seed port is opened after the tractor is turned at the ends of the field.

A 10-gal. milk can, inverted and supported on a triangular frame, serves as a hopper, Fig. 1. Note that the frame is bolted to the tractor drawbar. The seed spreader, or slinger, consists of a disk-harrow blade fitted with angle-iron vanes and welded to one shaft of a right-angle gearbox such as that used on a combine. This drive unit is mounted inside the tri-

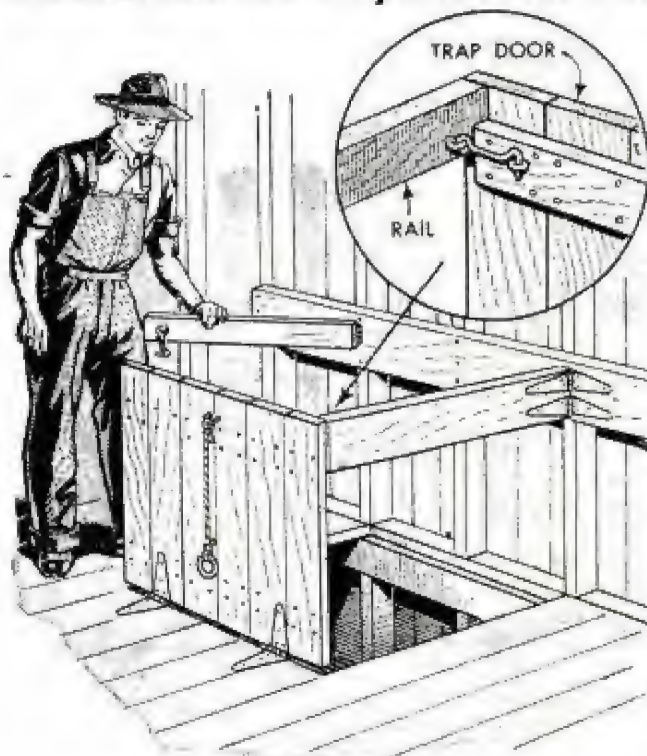
ON TRACTOR

angular frame in an inverted position and directly below the cover of the milk-can hopper. It is important when mounting the unit to place it off center with relation to the seed port so that the greater amount of seed will be thrown to the rear when the seeder is in operation. For example, if the disk rotates counterclockwise, the seed port should be located to the left of the center of the disk so that the seed will be distributed uniformly by the vanes. The driving shaft of the gearbox is connected to the tractor power take-off through a universal joint and whatever length of shaft extension is necessary to assure a positive drive. Fig. 2 shows the frame which supports the hopper and the drive unit. Some changes may have to be made in order to accommodate other types of gearboxes and variations in tractor drawbars. For this reason, the frame is not fully dimensioned, and dimensions given are only average. For sowing under some conditions, it may be necessary to set the spreader disk at a greater height above the ground. To do this, it would only be necessary to build a higher mounting for the gearbox and lengthen the vertical hopper supports. All parts of the frame which support the hopper are welded together for extra strength and rigidity. In addition to being bolted to the tractor drawbar, the frame is also braced to the tractor transmission at some point where it is convenient to attach a brace. This will prevent the hopper from rocking forward or backward



when traveling over rough ground. In using a broadcast seeder of this type it is best to sow only on quiet days, especially when sowing clover or light, chaffy, grass seed. Sowing on windy days may result in an irregular distribution of the seed. If the spreader disk and vanes are discarded parts and are rough or rusty when installed, they are easily polished by feeding a quantity of sand through the mechanism.

Guardrails for Hayloft Door Fold Against Wall When Not in Use



There will be no danger of falling through the trap door of the barn loft, even at night, if the door is fitted with guardrails. The rails, which are hinged to the barn wall, swing outward and are hooked to the trap door when it is in the upright position. When the door is closed, the rails are folded flush against the wall.

Improving Ticket-Window Counter

It is easier to pick up tickets from a wooden counter of a ticket window if several rows of furniture nails are driven into its surface. The nails raise the tickets so they can be grasped with finger tips.

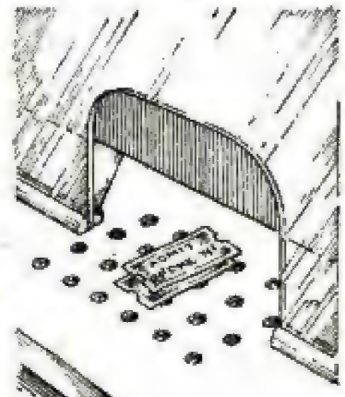


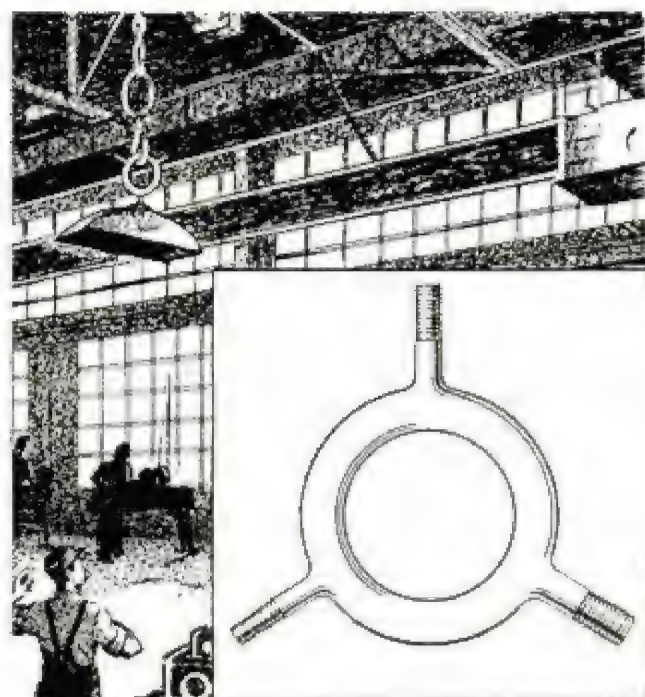
Table-Top Guide Strip for Knife Speeds Skinning Pork Sides



One farmer reduces the time required for skinning pork sides by nailing a thin strip of wood along the front edge of his worktable. When the meat is laid on the table, skin side down, the strip serves as a guide for the knife, permitting a uniform depth of cut which removes the skin without cutting into the fat. The knife, of course, is held parallel with the table top.

Eyebolt to Lift Machinery Parts Has Three Thread Sizes

The number of eyebolts necessary to lift various machinery parts with a shop crane can be reduced by using eyebolts having three thread sizes. These are made by welding three threaded studs to a ring at equidistant points. In some shops, one of these eyebolts is sufficient while in others



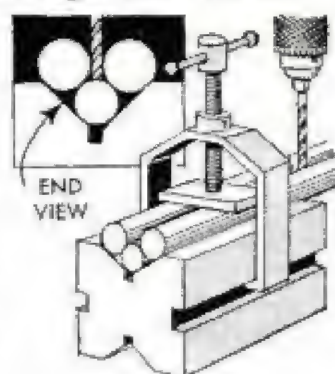
several are required to provide a wider range of thread sizes.

Fred A. Walters, Battle Creek, Mich.

Drilling Holes Through Rod Stock

When a hole is to be centered through a rod, the rod to be drilled is placed in a V-block and two additional rods, each of the same diameter, are placed one on each side of the first. All three are then clamped in position as shown. The diameter of the clamping rods must be such that, when clamped in place, the distance between them exactly equals the diameter of the hole to be drilled. In this position, they serve as an accurate guide for centering the drill.

H. Moore, Leeds, England.



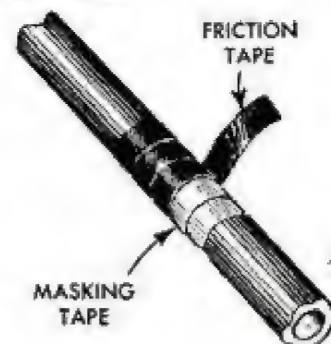
Finding Amount of Water in Well

To determine the number of gallons of water in a well or vertical, cylindrical tank, multiply the depth of water in inches by 34 and move the decimal point four places to the left. Then multiply the result by the square of the diameter of the tank or well (also in inches). The resulting figure is the quantity of water in gallons.

Repairing Air-Hose Leak

If an air hose develops a leak and no rubber tape is available to repair it, you can make a temporary repair by wrapping the hose with masking and friction tape. First wrap the hose with three or four layers of masking tape, overlapping each turn, and then wrap an equal number of layers of friction tape over the masking tape. The masking tape is used because it is airtight and the friction tape gives the necessary strength to the repair.

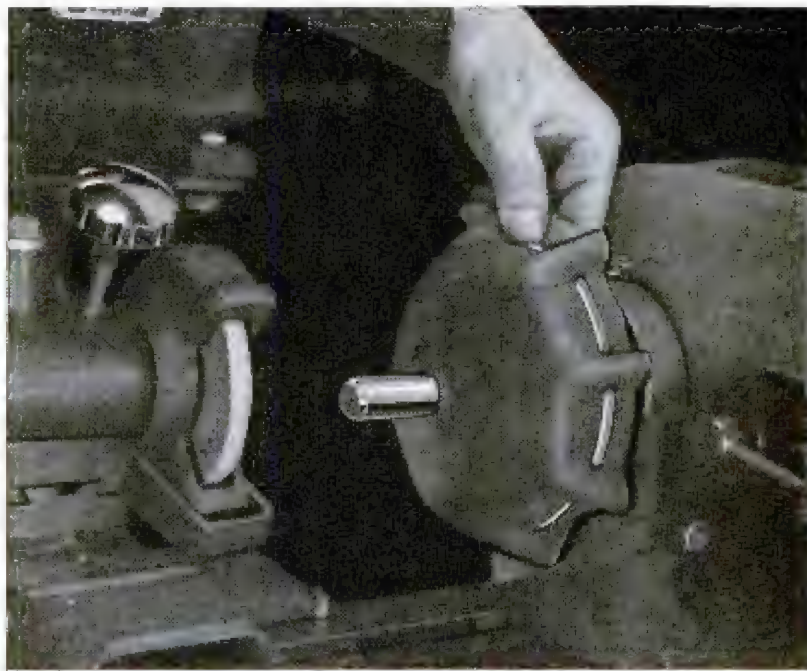
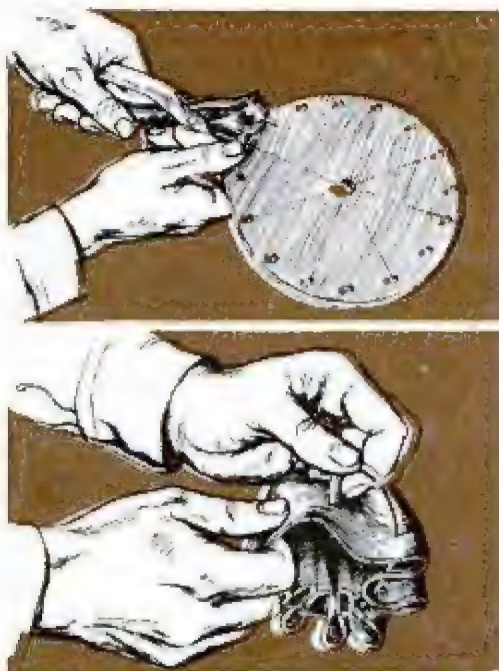
John Stankiewicz, Charlestown, Ind.



Typewriter Case Stores Paper

Placed in a large Manila envelope, a good supply of stationery can be carried inside the lid of a portable-typewriter case. Select an envelope that fits tightly in the lid.—Pat Fey, New York City.

Rubber Cover Keeps Lathe Chuck Dust-Free



Abrasive dust from grinding operations causes most of the wear in a lathe chuck. Small work, where the grinding wheel must be operated close to the chuck, results in the greatest accumulation of dust. To protect either a three or four-jaw chuck from dust, make a rubber cover with a drawstring closure. The cover can be made from a discarded inner tube, and will not interfere with the normal use of the chuck. First, cut a disk from heavy paper and fold it over the chuck, trimming the edge of the paper flush with the back edge of the chuck body. Then, place the paper pattern on a piece of inner tube and cut a disk the same

size as the pattern. Punch 16 small, equally spaced holes around the edge and also cut or punch a hole at the center of the disk somewhat smaller than the diameter of the work. Thread a leather shoelace through the holes to serve as a drawstring. If desired, the spaced holes may be omitted and the closure made by snapping a strong rubber band over the cover after it is placed on the chuck. To use, place the work in the chuck and tighten the jaws. Slip the cover in place against the face of the chuck with the work projecting through the center hole, and then tighten the drawstring and knot it to hold the cover securely in place.

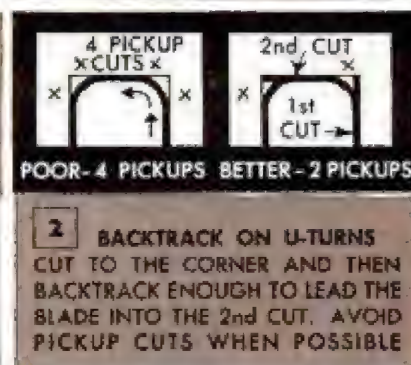
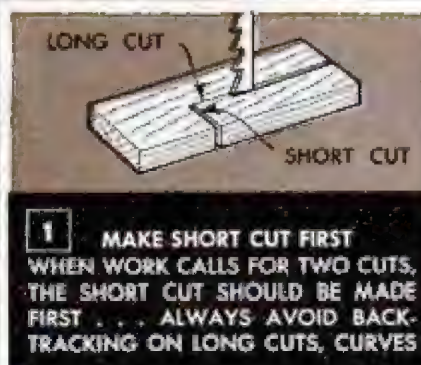
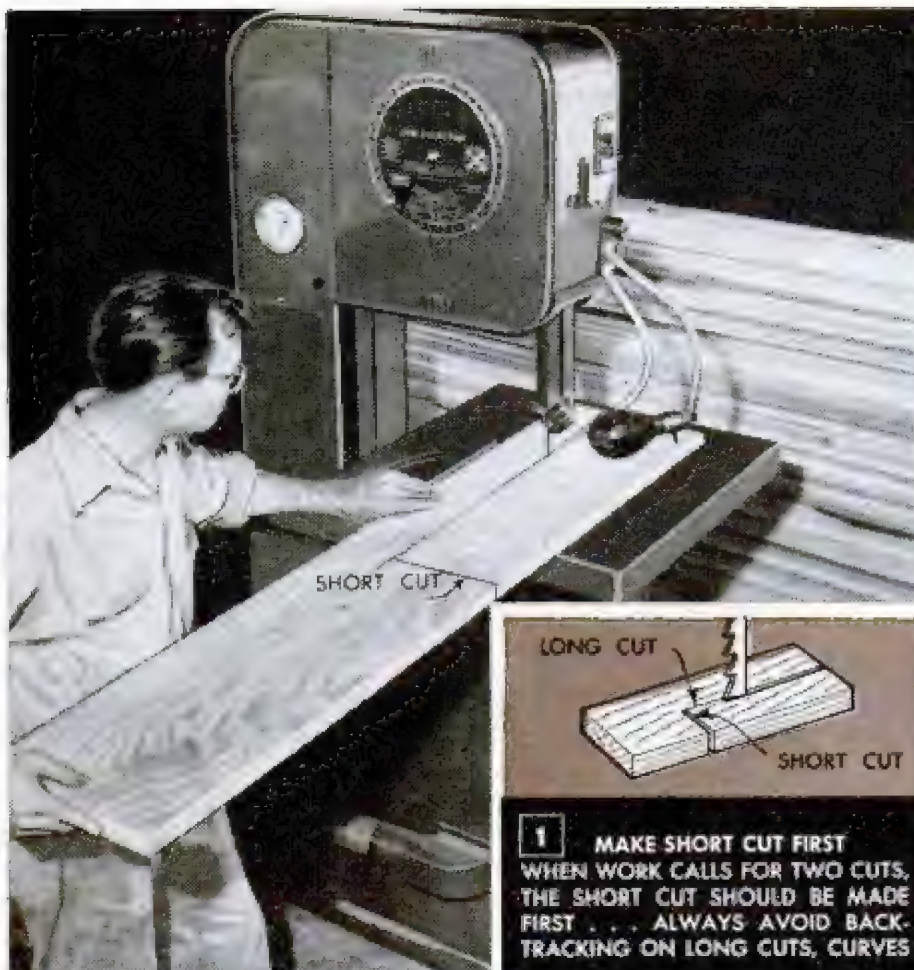
Harrow Disk in Feed Kettle Aids Cooking Mash

When cooking mash in a large feed kettle, you can eliminate much of the stirring by laying a harrow disk in the bottom of the kettle before dumping the grain into the water. The disk helps prevent scorching of the grain by keeping it from coming in contact with the hottest part of the kettle, and the water beneath the disk bubbles up through the center hole, agitating the mash for more thorough cooking. Note that the harrow disk must be placed in the kettle with its concave side downward.

Mirror on Combine Grain Bin

By using a rear-view mirror, fastened to the back of the grain bin of a combine, the amount of grain in the bin can be noted at any time without getting down from the tractor. The mirror is attached to the top of the bin and adjusted so the grain can be seen from the tractor seat.





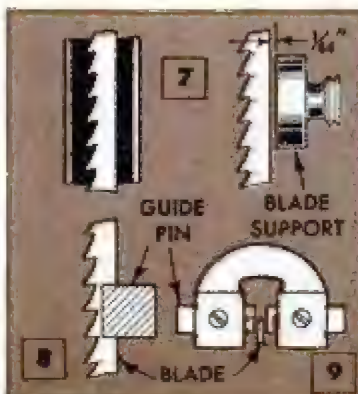
OPERATING a bandsaw is not difficult and anyone can do it with a little practice, but the difference between merely operating a saw and really doing expert work with it lies in the ability of the operator to do intricate cutting without running into numerous "booby traps." This article is intended to acquaint the beginner with the "tricks of the trade" and help him produce expert work.

Adjustments: After the blade is put on the bandsaw, it must be tensioned. Although some saws have a scale to simplify tensioning, it is merely a matter of drawing up the blade until it "feels" about right, Fig. 10. Note that the blade should not be set too tightly. A $\frac{1}{4}$ -in. blade should have about $\frac{1}{4}$ -in. side play. By means of the

BANDSAW

By Sam Brown

tilting screw, the blade is tracked to run in the center of the wheels, left-hand detail, Fig. 7. Turn the drive pulley by hand, as in Fig. 6, to check the adjustment. Then, the guides, which have been completely backed off up to this point, are adjusted. The blade support should be slightly clear of the blade, Fig. 7, right-hand detail, and the guide pins set to align with the bottom of the teeth, Figs. 8 and 9. If the pins are set forward of this point, they will cause the teeth to wear. The guides must also be ad-



TRACKING SHOULD PUT BLADE IN CENTER OF WHEELS

ADJUSTMENTS

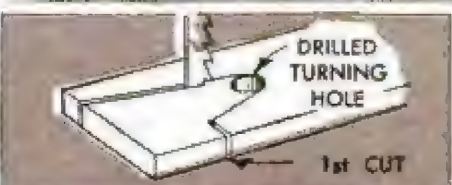
BLADE TENSION MUST BE SET BY FEEL. BLADE SHOULDN'T BE TOO TIGHT



3 "NIBBLE" NARROW CUTS
SHORT SIDE OF NARROW GROOVES
MUST BE NIBBLED. TECHNIQUE IS
USEFUL ON MANY JOBS. IT WORKS
BEST WITH A HEAVILY SET BLADE



4 "PIVOT" RIPPING CUTS
ON STRAIGHT RIPPING CUTS, THE LEFT
HAND IS HELD ALONGSIDE THE WORK
AND ACTS AS A PIVOT. RIGHT HAND
SWINGS THE WORK TO FOLLOW LINE



5 USE TURNING HOLES
BACKTRACKING AND PICKUP CUTS
OFTEN CAN BE AVOIDED BY BORING
HOLES IN THE WORK TO ALLOW FOR
SHIFTING OF THE BLADE POSITION

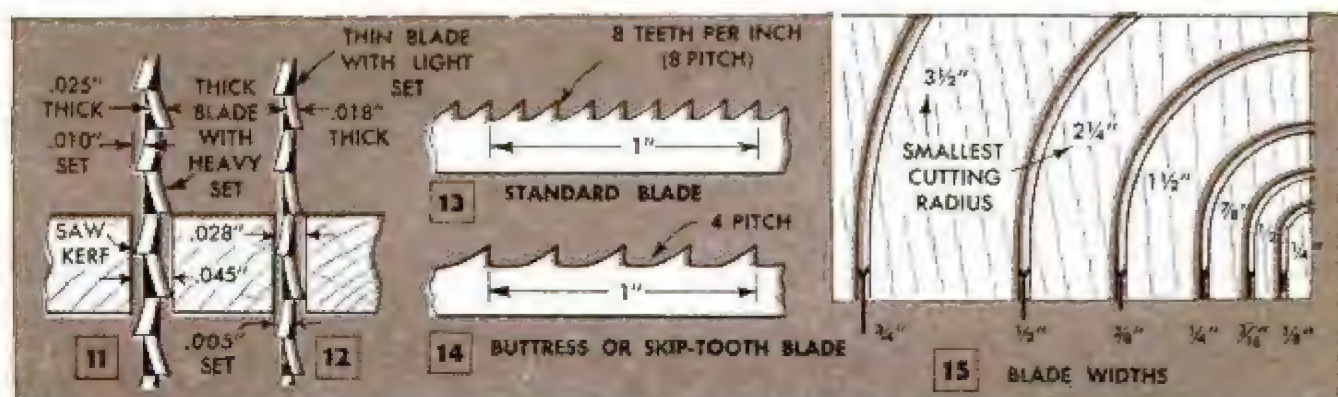
KNOW-HOW

justed close enough to the blade to keep it from twisting, but they should not come in actual contact with it. They can be set properly by placing a strip of paper between each pin and the blade and pressing the pins together. However, when doing this, be careful not to push the blade out of the vertical position.

Cutting technique: Fundamental bandsawing techniques are described in Figs. 1 to 5 inclusive. The general idea is to do the job with a minimum number of backtracking and pickup cuts. The left-hand diagram in Fig. 2 shows a U-cut made without

backtracking, but this method leaves four pickup cuts. When a pickup cut is made in this manner, the result is never quite as smooth as a cut made in one pass. Therefore, the method shown in the right-hand diagram is better as a little backtracking eliminates two of the pickup cuts.

The blade: For use on smaller bandsaws, blades range from $\frac{1}{8}$ to $\frac{3}{4}$ in. wide. The best practice, of course, is to use a narrow blade for light sawing, such as cutouts, and a heavier blade for other work. However, to avoid constantly changing blades, the $\frac{1}{4}$ -in. blade will be found best for all-purpose use. Important considerations in blade selection are the type of tooth and the amount of set. Fig. 13 pictures the standard blade; Fig. 14 shows the buttress



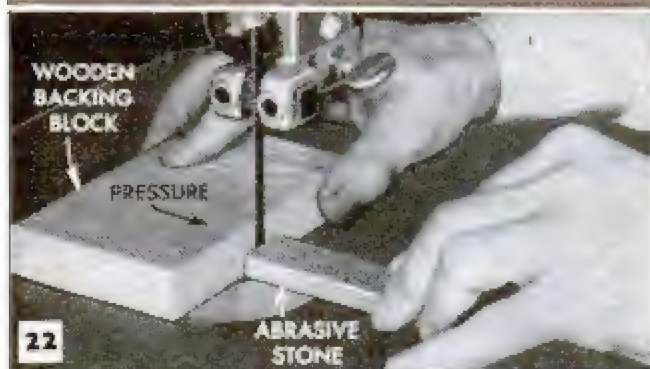
THE BLADE USE A SAW BLADE TO SUIT THE JOB. A $\frac{1}{4}$ " BLADE IS EXCELLENT FOR CUTOUTS BUT USELESS FOR RESAWING. A $\frac{1}{4}$ " WIDTH IS BEST ONE-BLADE CHOICE



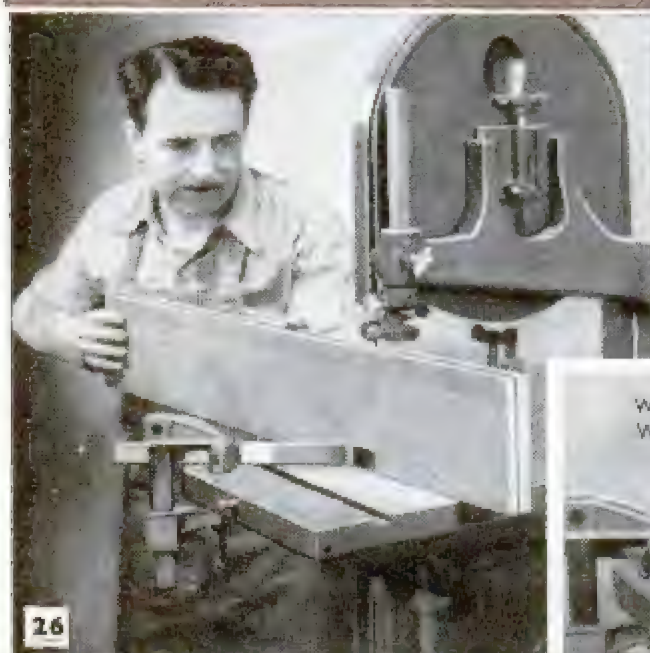
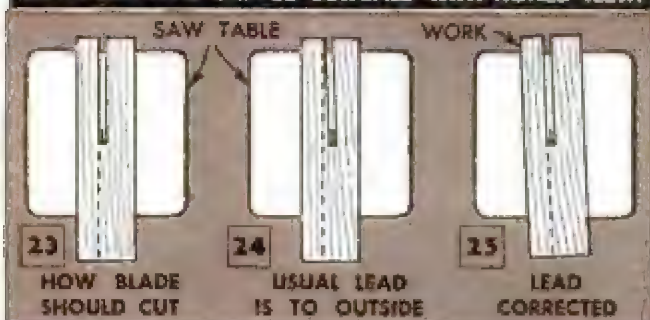
THE BANDSAW CUT ALWAYS SHOWS SOME WASHBOARDING, DEPENDING ON SAW SET. LEAD IS USUALLY TO OUTER EDGE OF THE TABLE



NORMAL WASHBOARDING CAUSED BY TEETH
ONE LONG TOOTH CAN DO A LOT OF DAMAGE
HONED TEETH CUT SMOOTHER BUT WORK HARDER
BLADE LEADS TOWARD SHARP SIDE



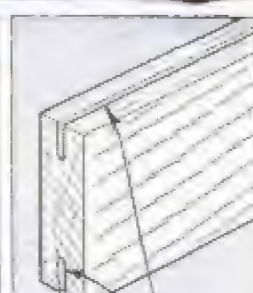
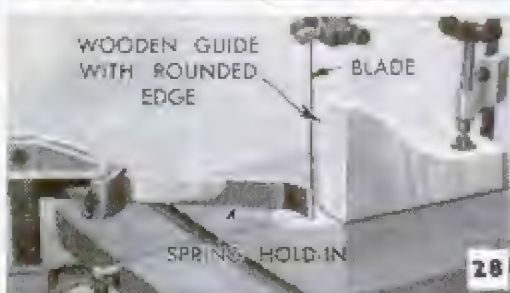
SMOOTHER CUTS CAN BE OBTAINED WITH HONED TEETH



or skip-tooth type blade. The latter is preferred by many craftsmen for sawing wood and plastics. Standard blades are available in a number of thicknesses from 20 to 28 ga., but a thin blade with a light set, Fig. 12, is commonly used on small bandsaws. The buttress blade in Fig. 11 is thicker and carries more set. Although the teeth of this blade are usually hardened and cannot be filed, the extra hardness retains both sharpness and set about twice as long as a blade of filing temper. The radius limitations of the various blade widths, Fig. 15, must also be considered when choosing a saw blade.

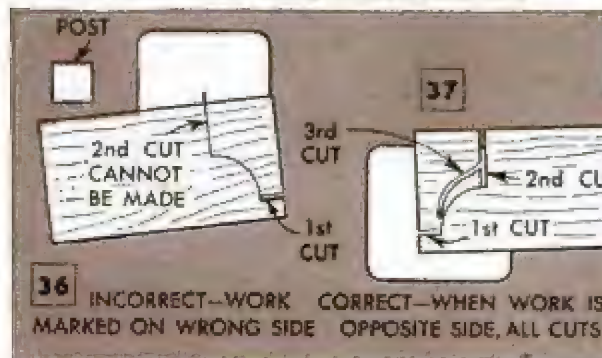
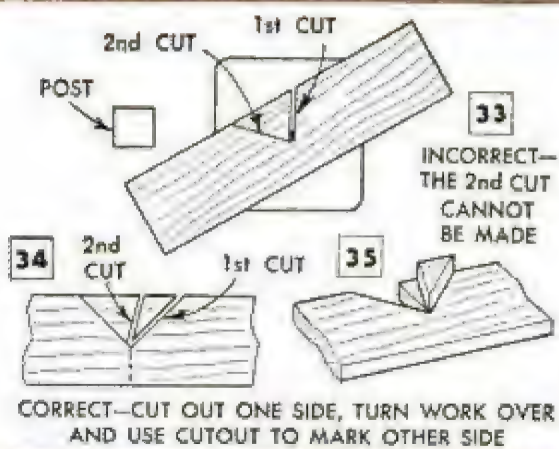
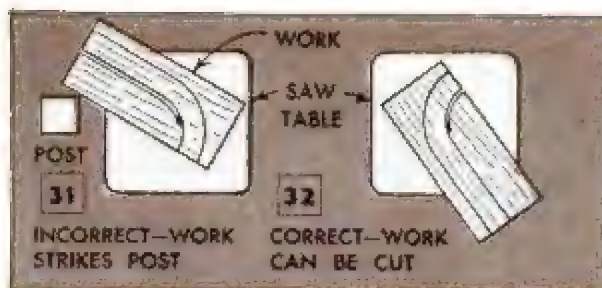
The bandsaw cut: Every tool makes a mark on the work, and the marks of a bandsaw blade resemble a washboard, Figs. 17 and 18. A blade having a heavy set "washboards" more than one with a light set, and a poorly made blade with a few long, snaggle teeth, as in Fig. 19, makes an exceptionally rough cut. Smoother cutting is attained by honing the teeth lightly as shown in Figs. 20 and 22. However, if the honing is overdone, it dulls the blade. If one side of the blade is dull and the other side sharp, the blade leads off toward the sharp side, Fig. 21. A perfect blade cuts straight, as in Fig. 23. Because the inside surface of the blade is in constant contact with the wheels, it dulls faster than the other side, and the blade tends to lead to the outside, Fig. 24. This lead is corrected by feeding the work at a slight angle as shown in Fig. 25.

Resawing: The job of making thin boards out of thick ones, or resawing, is the kind of work the bandsaw does better than any other type of saw. The simple resawing setup shown in Figs. 26 and 28 functions



RESAWING IS A JOB BANDSAW DOES BETTER THAN ANY OTHER SAW. WORK UP TO 6" THICK CAN BE CUT WITH 1/3-HP. MOTOR.

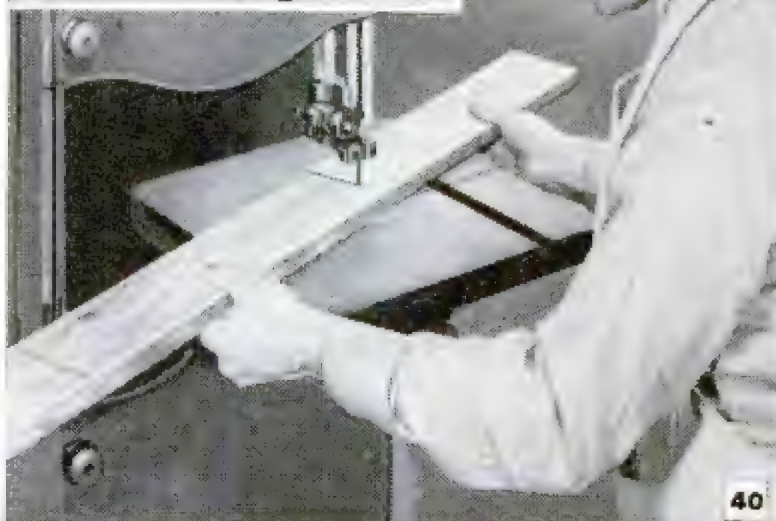
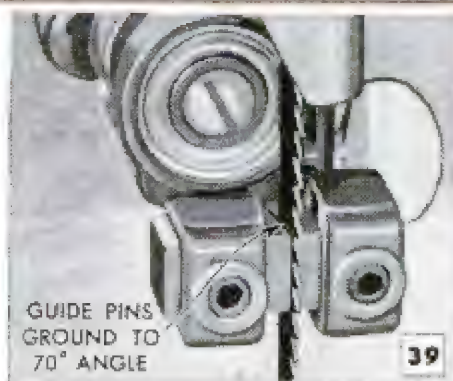
29 CUTS MADE ON CIRCULAR SAW



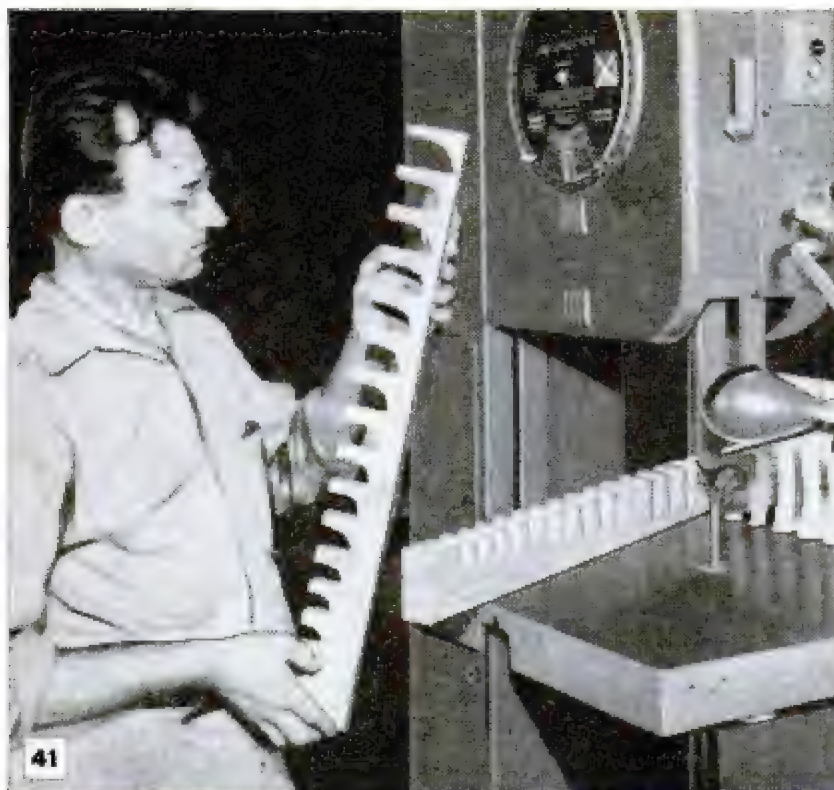
**WATCH
YOUR STEP**
DIAGRAMS SHOW THREE
TYPES OF BOOBY TRAPS
WHICH OFTEN FOOL
EVEN EXPERIENCED
SAWYERS

just as well as more elaborate fences. Fig. 27 shows the same job being done with a standard bandsaw fence and a wooden spring. Sometimes it is advisable to make circular-saw cuts on both edges of the work, as in Fig. 29, to serve as guidelines and also to reduce the cutting load. The blade used for resawing should be as wide as the bandsaw will carry, although good work can be done with the $\frac{1}{4}$ -in. blade. The buttress blade, with its hard temper and heavy set, is ideal for this work and does not clog with sawdust.

Booby traps: Certain bandsaw jobs can be cut in only one way, which is peculiar to that particular job. An example is shown in Fig. 30. Note that if the cut is made as in Fig. 31, the swing at the end of the cut will cause the work to strike the bandsaw frame and the cut cannot be completed. The right way to do this is to begin sawing at the opposite end as in Fig. 32. Most center cuts in long work must be completed by turning over the work as in Figs. 33 to 35.



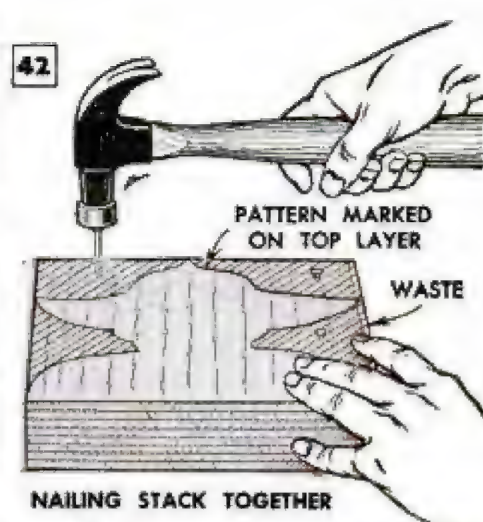
ANGLE GUIDES ARE USEFUL FOR INTRICATE SAWING AND
SQUARE CUTOFFS IN LONG WORK



41

STACK SAWING

IS USEFUL IN MAKING DUPLICATE PARTS. SIX LAYERS OF $\frac{3}{4}$ " STOCK OR 15 LAYERS OF $\frac{1}{4}$ " PLYWOOD ARE EASILY CUT IN ONE OPERATION



42

NAILING STACK TOGETHER



43

STACK HELD IN FORM

It also will be found that many booby traps are due to marking the work on the wrong side. The job shown in Fig. 36 cannot be continued, but if the work is marked on the other side, all cuts are easily made, Figs. 37 and 38. As bandsawing experience is acquired, each job is automatically visualized before it is started, thus eliminating "blind alleys" and excessive backtracking.

Angle guides: If the outer ends of the guide pins are ground to a 70-deg. angle and inserted end-for-end as in Fig. 39, long work can be cut off squarely as shown in Fig. 40. This setting also will be found useful for intricate cutting jobs. If the angle guides are used only occasionally for such a special job, it is not necessary to

grind the lower guide pins at an angle. Merely back them off until the blade is again set square.

Stack sawing: The tremendous cutting capacity of the bandsaw makes it practical for sawing several pieces in one operation, Fig. 41. Usually, the work is nailed together as in Fig. 42, but it may be held by a form similar to that shown in Fig. 43. The pattern, of course, is marked on the top layer and the stack is sawed just about as easily as a single piece of work.

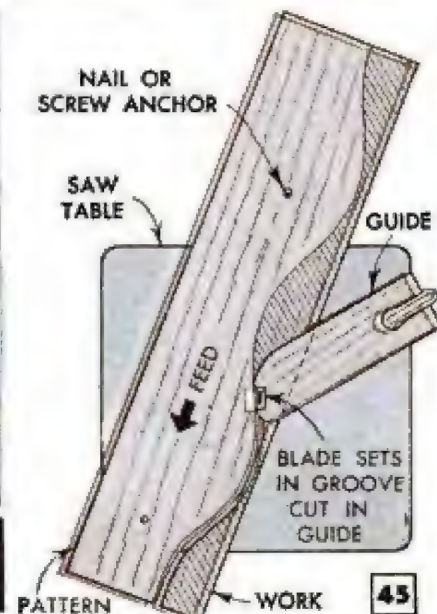
Pattern sawing: A typical setup for using a master pattern as a guide to bandsaw duplicate parts is explained in Figs. 44 and 45. Although work of this kind is easy to do and accurate, a blade with a fairly heavy



44

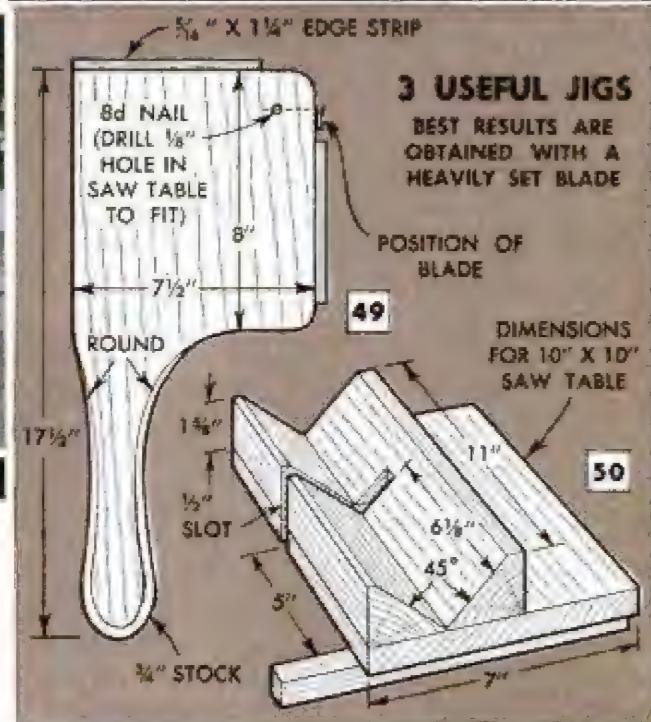
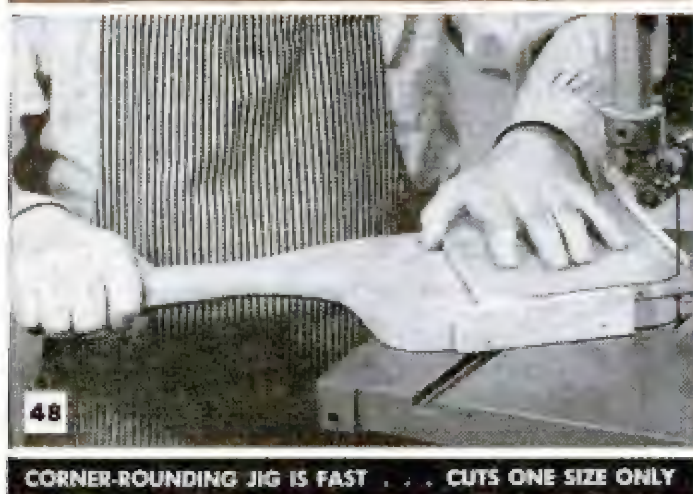
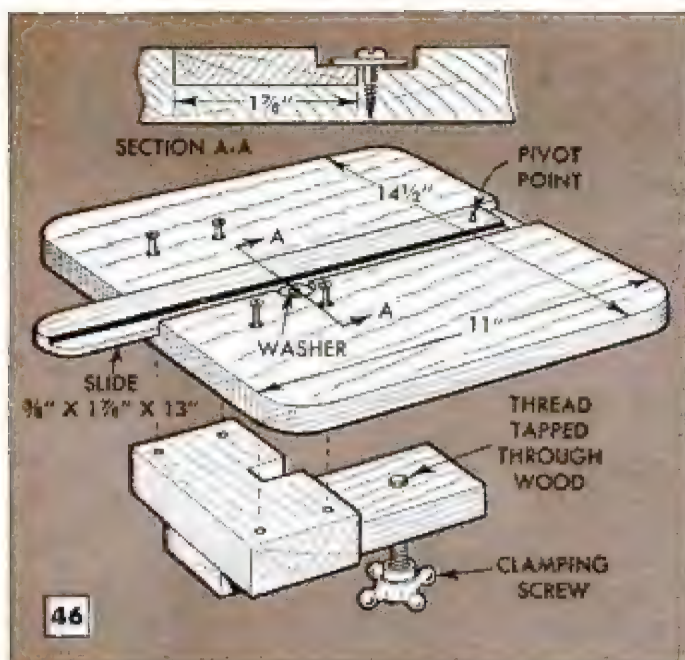
PATTERN SAWING

IS A SIMPLE METHOD OF CUTTING DUPLICATE PARTS WITH A PATTERN AND GUIDE



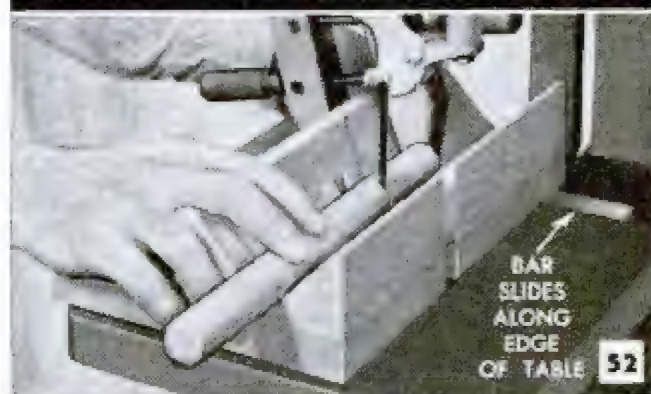
45

PATTERN WORK



set must be used in order to get the freedom of manipulation required to follow the contour of the pattern.

Useful jigs: Other than the standard fence and miter gauge, the most useful bandsaw jig is the one for circle cutting, Figs. 46 and 47. It also can be used for corner-rounding, but this work is done faster with a special corner-rounding jig, Figs. 48 and 49. However, this jig permits cutting one size only, usually about a 1 3/8-in. radius. The pivot fits into a small hole drilled in the bandsaw table in line with the blade teeth. Another handy device is the V-block jig shown in Fig. 50. It is used for cutting 45-deg. bevels as in Fig. 51 and also can be used as a cutoff guide for round stock. In the latter case, the guide bar rides along the edge of the bandsaw table as in Fig. 52. It is not practical to use any kind of a fence or jig with a thin blade having a very light set as some blade leading is inevitable and the light-set blade does not cut a kerf wide enough to permit freeing itself. A hardened blade having a fairly heavy set will make a true cut for a long time and do perfect work with any type of jig involving a fixed line-of-feed direction.

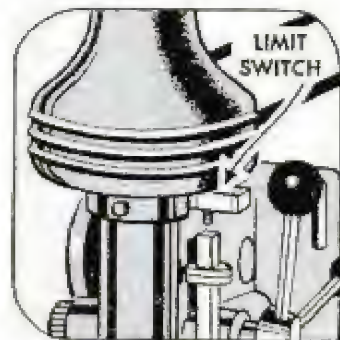




Cardboard Cartons Held Open By Garden-Hose Sections

Packing cardboard cartons is done faster if the flaps are held open by split sections of garden hose. It takes just a moment to slip them in place and to remove them when the carton is packed. Cut the sections several inches long and slit one side.

Automatic Starting Switch For Drill Press



Mounting a limit (sensitive) switch on a drill press so it is operated by the depth-stop rod, automatically starts and stops the machine. When the spindle returns to the "up" position, the switch is opened and the machine is turned off. Then, when the spindle is lowered, the switch is closed, turning on the drill press.

Asher M. Wolfe, Bloomsburg, Pa.

Lard Oil Aids Tapping Blind Holes



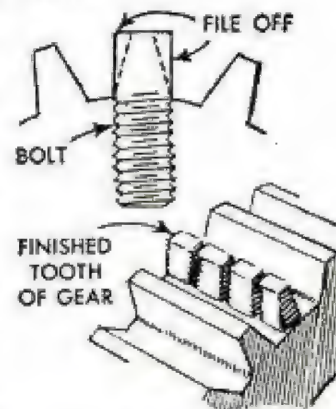
When a bottoming tap is used in a blind hole, chips tend to collect in the hole and block the progress of the tap. To prevent this, fill the hole with thick lard oil before inserting

the tap. Then, as the tap enters, it forces the oil from the hole and the chips are carried away in the process.

Henry Hanscom, Elmhurst, Ill.

Gear Teeth From Bolts

One man who wished to salvage a gear having broken teeth found that teeth fashioned from bolts made satisfactory replacements for the broken ones. To do this, the remaining portion of a damaged tooth is filed away, and a



center line for the new tooth is scribed on the gear. Several bolts are selected so that when placed in a row they equal the width of the original tooth. Then, holes are drilled and tapped for these bolts along the scribed line. After the bolts are turned into the holes, the heads are cut off and the bolts are brazed in place and filed to shape.

Ralph Steider, Aurora, Neb.

Cutting Case-Hardened Rods

To cut case-hardened rods without the proper tools, first grind through the outer case. Then cut the rod with a hacksaw and grind the ends smooth.

John W. White, Ware, Mass.

Hinged Section of Barnyard Fence Lowers to Form Manger

Hinged at the bottom and held in position by chains, a reinforced section of fence is lowered to form a manger and raised, when not in use, to become again part of the fence. Stanchions can be made by setting heavy posts along the length of the manger, spacing them the desired distance apart. This idea is suitable for both high and low fences and, if used for the latter, the cattle are able to feed from either side.

Marion L. Rhodes, Knightstown, Ind.

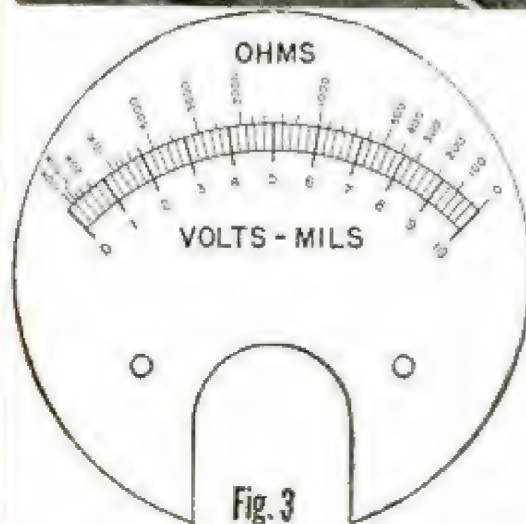
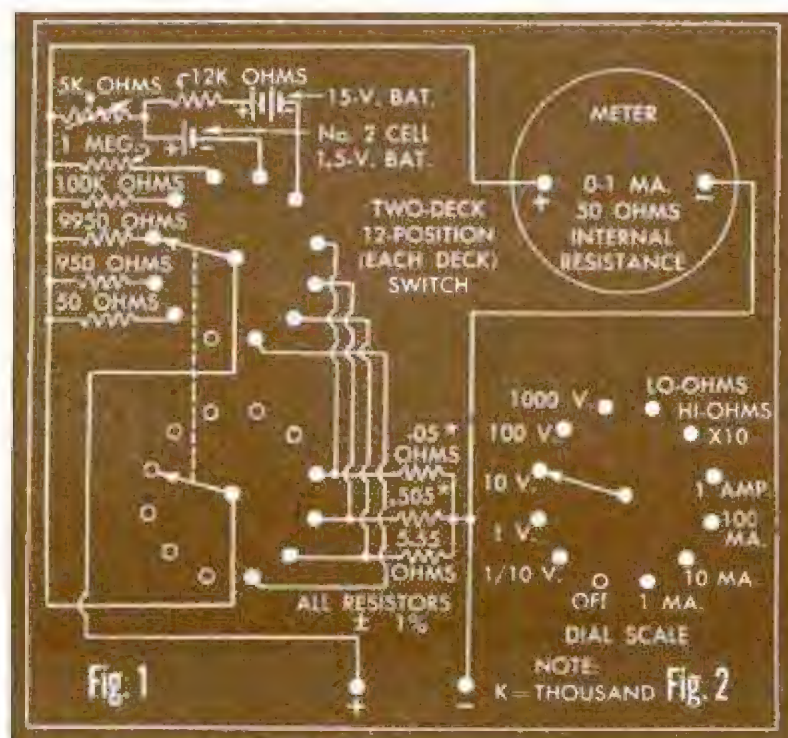
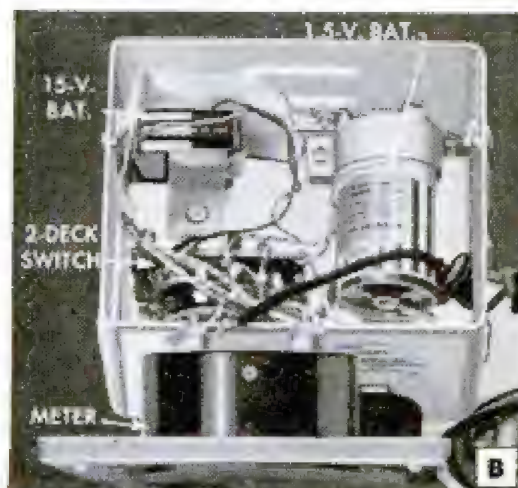
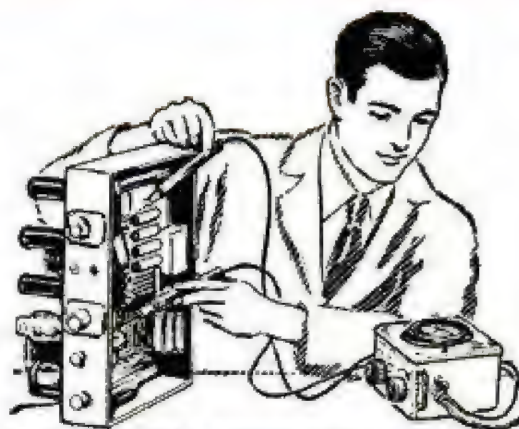


UTILITY VOLT-OHM CHECKER

THE MOST useful test instrument for the student and experimenter is a volt-ohm checker. While all values are given in a schematic circuit diagram the student should check and verify each specification and in so doing gain more knowledge of Ohm's law and how to apply it. The instrument in photos A and B was built by students as a class project.

A two-deck 12-point rotary-type switch is used for selecting the various positions. A small Bakelite plate, $1\frac{3}{4} \times 2$ in., with the fixed resistors attached is mounted on the back of the rotary switch, and the wiring is quite simple. All parts values are identified in the diagrams; the fixed resistors are all $\frac{1}{2}$ -watt carbon types except the special resistors .505-ohm and .05-ohm marked by stars in Fig. 1. These special resistors were assembled by using two $1\frac{1}{2}$ -megohm resistors for the forms; Nichrome resistance wire was wound on these forms and measured on a bridge to obtain .05 and .505 ohm. About 2 in. of No. 16 resistance wire was used for .05 and about 2 in. of No. 26 for .505. The wire was then soldered to the resistor leads, actually placing the two resistances in multiple, but due to their high value no difference would be observed in the smaller values. The 5.55-ohm resistor was made by connecting two 11-ohm carbon resistors in parallel; the 5000-ohm variable resistor is a midget linear-taper type. Two pointer-type dial knobs, a set of test prods and a 0-1 milliammeter complete the assembly which is made in a metal case $3\frac{1}{2} \times 4 \times 5$ in. deep. The meter is

(Continued to page 242)



HOW TO BUILD A GEIGER-MUELLER

By F. L. Brittin, S.M., J.R.E.

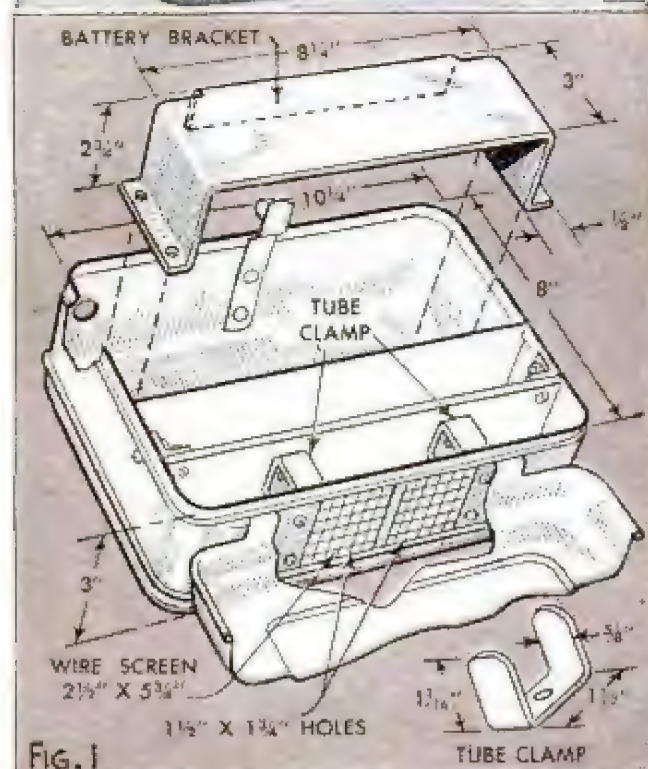
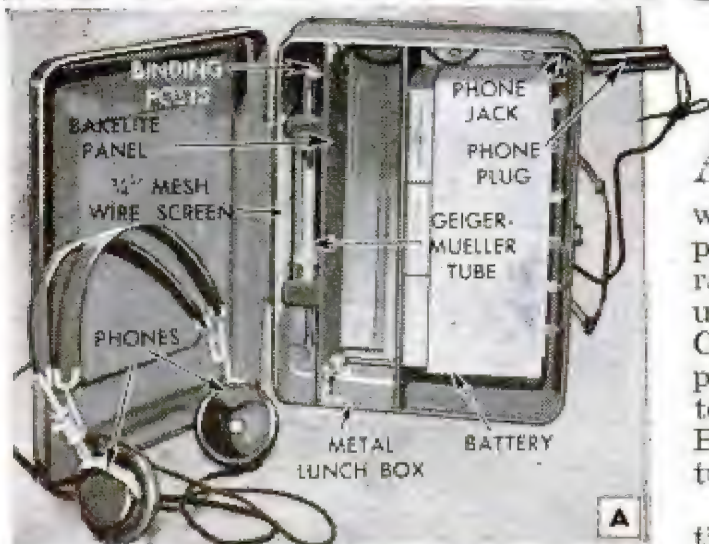


FIG. 1

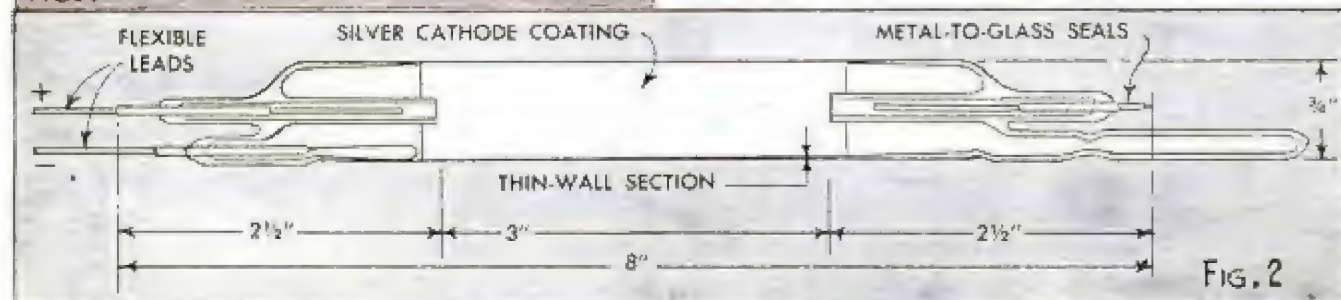


FIG. 2

ANYONE can build and operate this simplified Geiger-Mueller survey meter, which is an instrument for detecting the presence of radiations emanating from radioactive substances such as valuable uranium and radium. Specifically, the Geiger-Mueller tube, which is the most important component of the instrument, detects X-rays, cosmic rays and gamma rays. Beta rays can also be detected by Geiger tubes with very thin cathode walls.

When any one of the four types of radiations referred to above enters the Geiger tube, the gaseous mixture within the tube is ionized and the tube will deliver a definite pulse that can be used to actuate a meter, or a set of headphones. The uranium survey meter illustrated and described is a "Geiger counter" similar to those used in all of the recent sensational "strikes" and incorporates a set of high-impedance headphones as the indicating device for radioactivity detection. The exceptionally high sensitivity of this particular instrument to stray radiation is exemplified by infrequent clicking sounds heard in the headphones, caused by cosmic rays when the instrument is not in a field in which other radiation is present.

An ordinary metal lunch box of the type designed to include a small Thermos bottle is employed to house the instrument. It

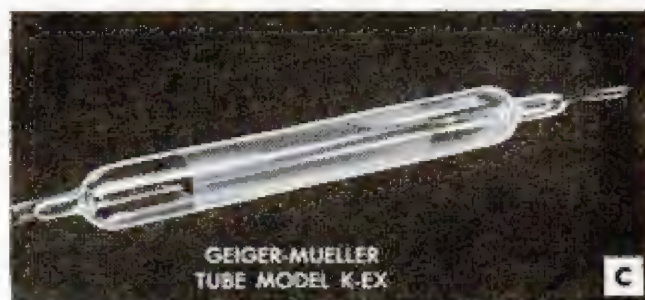
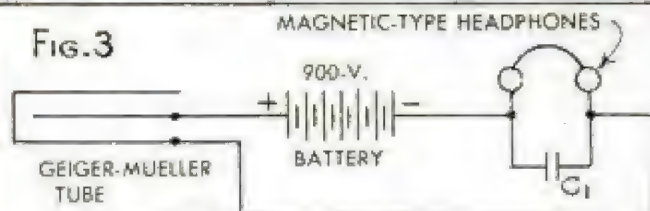


FIG. 3



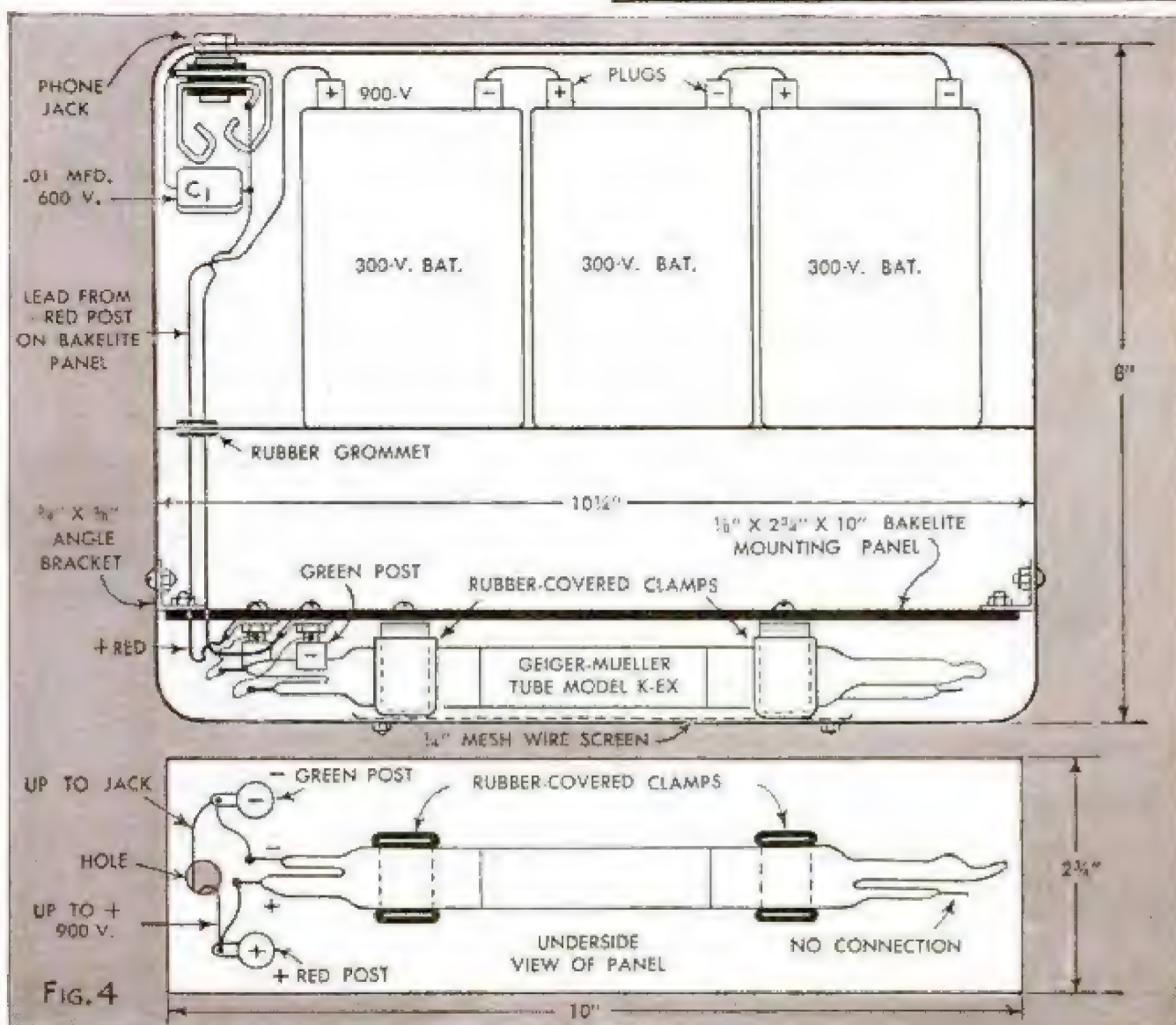
URANIUM SURVEY METER



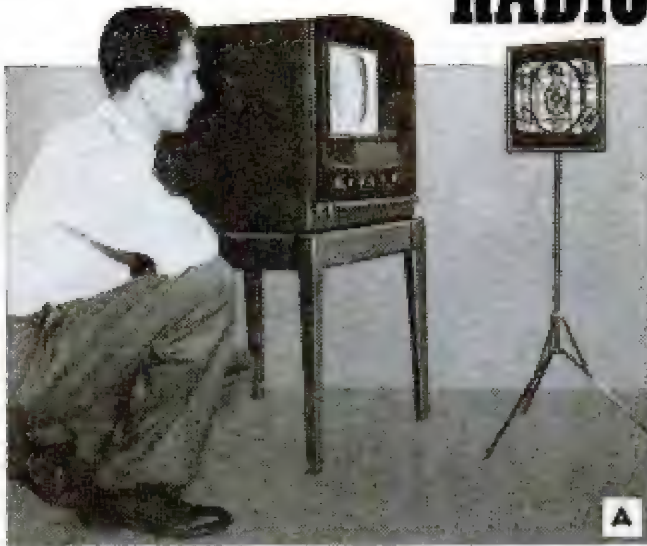
provides a rugged case $10\frac{1}{4}$ in. long, 8 in. wide and 3 in. deep. This case is easily portable and only a few minor alterations are necessary, as will be noted in Fig. 1. The two openings, cut to provide screened windows, are backed with a strip of $\frac{1}{4}$ -in.-mesh wire screen, $2\frac{1}{2}$ in. wide and $5\frac{3}{4}$ in. long. This wire screen is held in position by four short 6-32 machine screws, washers and hex nuts. A $\frac{3}{8}$ -in. hole is drilled for mounting the open-circuit phone jack.

The Geiger-Mueller tube is mounted on a $\frac{1}{8}$ -in. Bakelite panel by means of two rubber-covered clamps. These clamps are made as detailed in Fig. 1, or, $\frac{3}{4}$ -in. fuse clips may be used. They are mounted $4\frac{1}{2}$ in. apart and $2\frac{3}{4}$ in. from each end, by means of short 6-32 machine screws and hex nuts. A $1\frac{1}{8}$ -in. length of rubber tubing is slipped over the ends of each clamp where it contacts the Geiger-Mueller tube to hold it in position. This Bakelite panel is mounted in the case, $1\frac{3}{8}$ in. above the screened openings, by means of four $\frac{5}{8}$ x

(Continued to page 242)



RADIO-ELECTRONICS HINTS



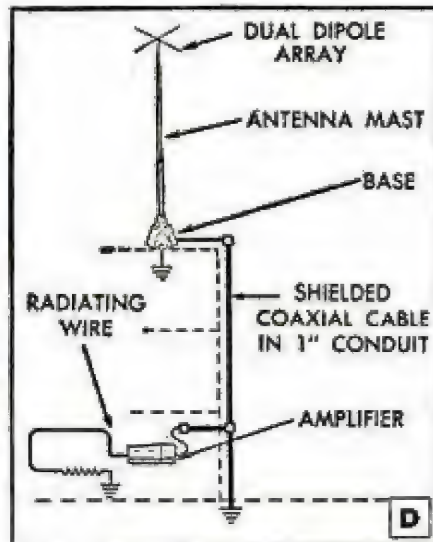
A—Portable Miro-Pix mirror enables TV serviceman to view the screen pattern of a television receiver while adjusting the rear controls and ion trap



B—Compact Electro-Voice speech clipper operates directly from any high-impedance microphone into the microphone input of a conventional speech amplifier. It is a specially designed peak-limiting preamplifier that clips the tops and bottoms from speech frequencies which rise above a preset amplitude, thus providing higher articulation and intelligibility in radiophone and similar services



C—Slide-projector owners can add sound to silent slides by means of this Audio-Slide unit consisting of a 4-watt amplifier, microphone and 6-in. PM speaker. Flat case acts as projector stand



D—Puratone signal-booster system for demonstrating sets in stores located in noisy city areas. Unit covers AM, FM, short-wave bands



E—Automatic radio silencer called Radi-Off shuts off the radio as soon as the telephone receiver is lifted for conversation. It also turns the radio on again when telephone communication is ended



F—Wireless Microgroove record player for long-playing records; it works through your radio receiver.



G—Funnel-shaped device called a Signal-Soc is claimed to improve reception in auto-radio receivers



H—Imagine the luxury of reading under an efficient bed lamp while listening to your favorite radio orchestra playing softly in your ears. This 5-tube Lullaby a.c.-d.c. radio clamps to the head of a bed

Magnificent Enlarging ***PLUS***



KODAK PRECISION ENLARGER (Showing A and B Assemblies)

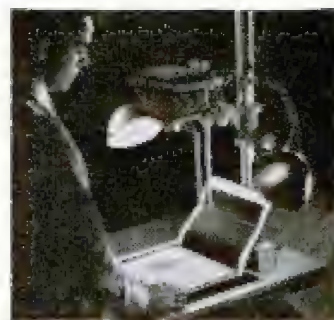
Stand assembly takes either the A or B enlarger head. A assembly accepts negatives up to $2\frac{1}{4} \times 3\frac{3}{4}$ inches . . . has friction-wheel drive for exact focusing. B assembly takes negatives up to 4×5 or $3\frac{1}{4} \times 5\frac{1}{2}$ inches . . . cooling system includes motor-driven fan. Wide selection of Kodak Ektar and Ektanon Lumenized lenses results in superb projection prints. At your dealer's.

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CLOSE-UP PHOTOGRAPHY—

By assembling as a camera and utilizing the lengthy extension of the bellows.



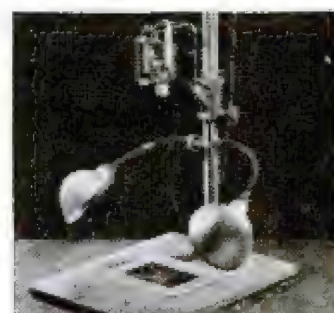
PHOTO- MICROGRAPHY—

The microscope attachment makes light-tight connection with the microscope. Exposure controlled by microscope lamp.



CINE-TITLING—

The inclined arm of the stand assembly supports a Cine-Kodak camera for making titles.



"Kodak" is a trade-mark

Utility Volt-Ohm Checker

(Continued from page 237)

mounted in the lid. If the builder prefers to make a wooden case, it can be built of $\frac{1}{4}$ -in. plywood, with the same inside dimensions given above.

The case is large enough to house the $1\frac{1}{2}$ -volt flashlight cell and a Burgess type U-10-E, or similar, 15-volt battery. Dial scale for the switching points, Fig. 2, and the zero adjustment arrow may be made on a strip of paper and pasted on the case as indicated in photo A. The meter-dial scale, to replace the original scale on the 0-1 milliammeter, may be the one shown in Fig. 3 if you are using a 2-in. meter. If your meter is larger, merely make a photostat enlargement to the required size. If the resistor values are as specified, no alterations in the scale will be necessary.

How to Build a Geiger-Mueller Uranium Survey Meter

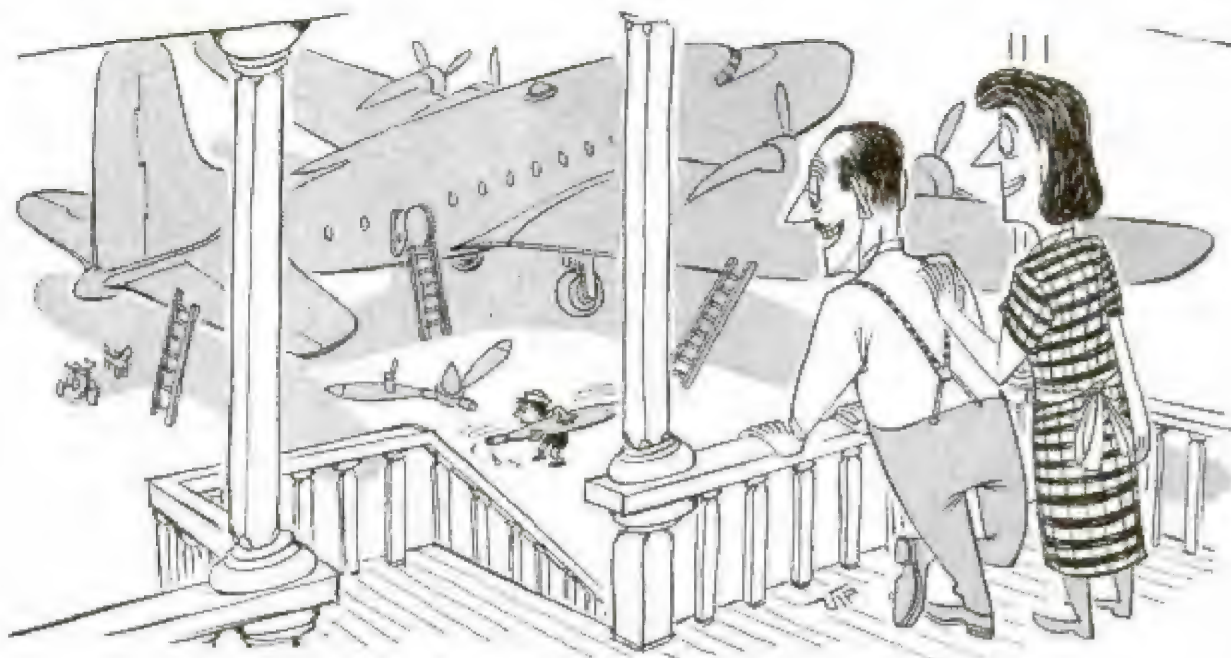
(Continued from page 239)

$\frac{5}{8}$ -in. angle brackets. The battery clamp is made from $\frac{1}{16}$ -in. sheet metal and holds the three batteries in position.

Photos A, B, D and F show various views of the completed instrument. Fig. 2 is a

sectional drawing of the highly efficient "Keleket" model K-EX Geiger-Mueller Gem tube used in this instrument; the actual tube is shown in photo C. It should always be handled by the ends; do not touch the fragile center. The schematic circuit diagram is given in Fig. 3, and the pictorial wiring and assembly diagram appears in Fig. 4. The underside view of the panel shows the method of mounting and connecting the tube. Note that the center positive and the outside negative leads are brought out to two binding posts mounted on the Bakelite panel; keep these flexible leads well separated. The center positive, or "hot," lead goes directly to the positive 900-volt battery terminal and should never be touched when unit is "on;" always keep case dry. The open-circuit phone jack is in the negative battery lead. A .01-mfd. 600-volt fixed condenser is connected across the phone jack. Banana-type battery plugs with black for negative and red for positive, plastic insulated ends are used to connect the batteries in series. The phone plug is inserted only when the instrument is in use. There is practically no drain on the batteries; their life is estimated to be from six months to one year. These batteries list at \$11.00 each; the model K-EX Geiger-Mueller tube costs

(Continued to page 244)



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...takes a cat nap  and ...



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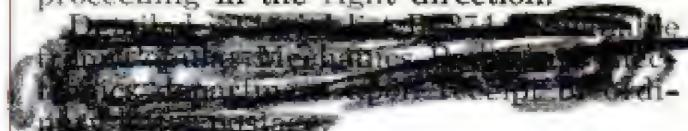
400 Pershing Road, Waukegan, Illinois
Johnson Motors of Canada, Peterboro, Canada

JOHNSON
SEA-HORSES
for DEPENDability

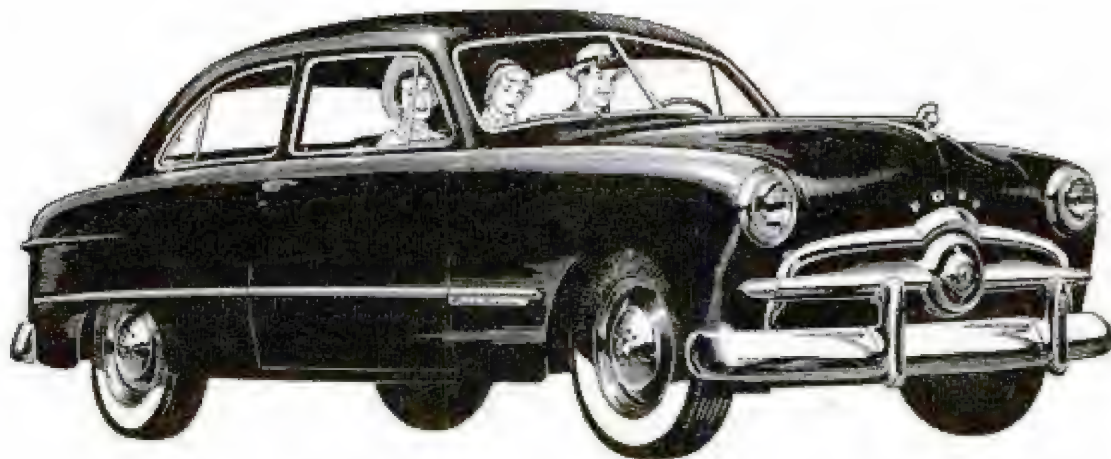
\$20.00 and it will give approximately 15,000 hours service in constant use. Before the survey meter is taken into the field for use, a quick test may be made to determine if it is functioning by merely holding it over the dial of a radium-illuminated watch as illustrated in photo E. If there is an increase in the number of "clicks," it will indicate that the unit is working satisfactorily. Before making a survey, a background count should be noted in an area free from radioactivity. A pair of 4000-ohm phones should be plugged into the instrument and the number of clicks heard in the phones counted for a period of one minute. Ordinarily, the background count will vary between 10 and 50 per minute.



A topographic map of the area to be surveyed should be completed by the prospector before entering the field. Furthermore, familiarity with the various types of ores associated with uranium, thorium, radium and other radioactive material should be obtained. It should always be remembered that many precious metals such as vanadium, cobalt, nickel, gold, etc., are sometimes found in proximity to the radioactive ores, and subsequent analysis may indicate a lode of considerable value composed of nonradioactive metals. As successive counts are recorded at different stations on the area being surveyed, differences in background count should be noted and plotted on the topographic sketch. The instrument will effectively direct a prospector to an area where the radioactive background is higher. When digging is started, samples of the ore or rock formation should be tested with the instrument to determine if the digging is proceeding in the right direction.



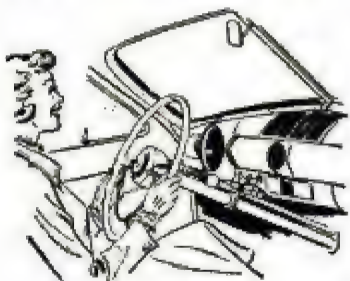
Drive a FORD and Feel the DIFFERENCE



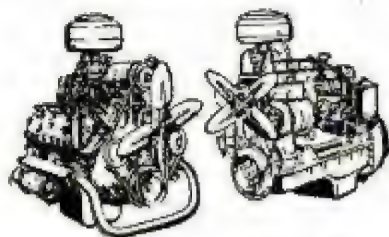
First time you drive the great '49 Ford, you sense immediately the new Ford "feel"—a feeling of handling ease and true control that's a revelation! It goes all the way through the car—brakes, engine, springs, frame, body, steering—to give you driving ease in three big elements of motoring pleasure.

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Second



... these new Fords have a feeling of *responsiveness* that's outstanding—satin-smooth acceleration, power to spare in both the new 100 h.p. V-8 and 95 h.p. Six. Only Ford in its field gives this power choice!

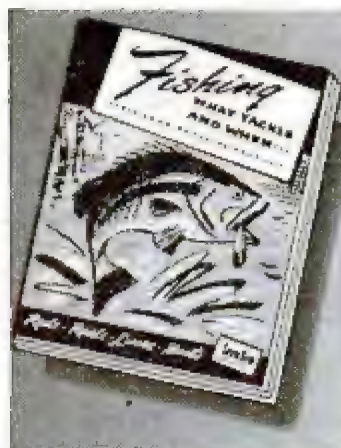
Third

... the feeling of *safety* and *sureness* that comes from such Ford features as "Lifeguard" Body of heavy gauge steel ... body and frame combination 59% stronger ... "Magic Action" King-Size Brakes 35% easier-acting.



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(Continued from page 177)

the parents of the next generation; (2) "inbreeding," or mating members of the same animal family together, so as to reveal hereditary weaknesses and to concentrate strong points; and (3) "crossbreeding," or combining the desirable qualities of different breeds.

When the model animal begins to measure up to specifications, it is ready for "mass production." The new model is put on loan for breeding purposes. Universities and state farms cooperate in introducing it.

Step into the Department of Agriculture's 12,000-acre experimental farm at Beltsville, Md., and you can preview some of these remarkable creations, soon to be readied for the production line. Animal experts will point out husky young steers in the laboratory's Shorthorn herd that have grown 14 percent fatter than average and have reached market weight six weeks sooner. The latest-model milch goat produces milk for a period 145 percent longer than did her ancestors. The streamlined Holstein cow, which in 1918 was yielding 678 pounds of butterfat a year, has been improved so that today's model averages 814 pounds, a 20-percent improvement.

The animal designers will show you how they made hens lay nearly 50 more eggs each year. They'll explain their plans for building up the flocks of the Karakul sheep in this country to make possible the production of Persian lambskin.

This year enough of such blueprinted knowledge will move out of the laboratory to the nation's farms to save thousands of dollars' worth of grain. For instance, a hog ready for market means an investment of ½ ton of feed—and with corn prices at a high level, every pound counts. The highly efficient, 1949-model pig is lower to the ground, heavier in the loin and eats far less for its weight than older models. Here are the latest specifications:

Legs short, body not too long, bones small; weight medium, preferably about 200 to 225 pounds; an even layer of fat along the back, 1½ to 1¾ inches thick; and at least half the weight to be made up of ham, loin, bacon, butt and picnic shoulder.

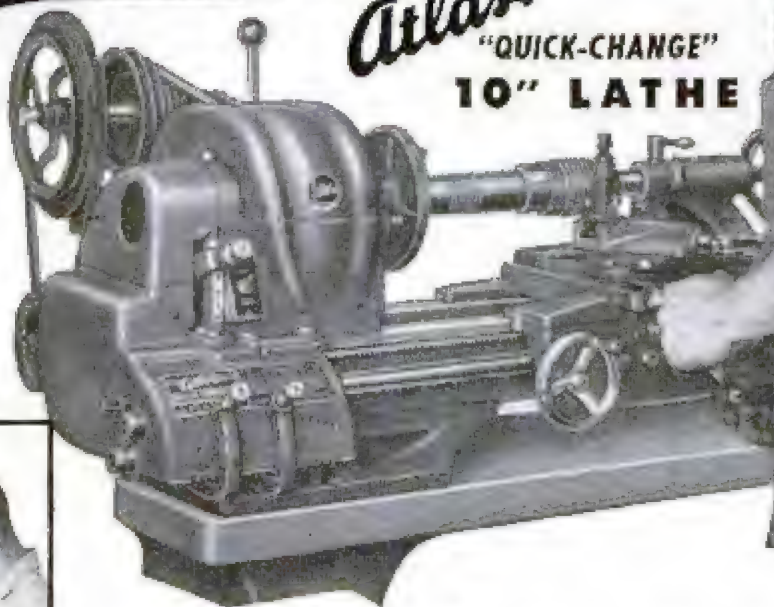
Right now, only about one in fifty U. S. hogs reaches these ideal proportions—but the scientists are beginning to get uniformity among the experimental-farm animals now undergoing the streamlining process. These ultra-efficient porkers give fewer spareribs and pigs' knuckles, but more bacon and ham for the amount of feed consumed. Recently, "performance tests"

(Continued to page 252)

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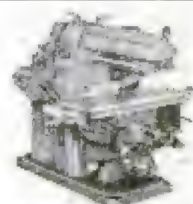
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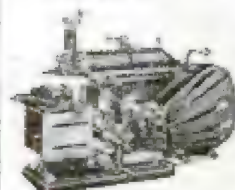
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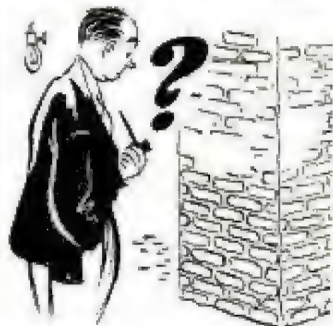
Insulating a Warm-Air Pipe

Q—One warm-air pipe from my furnace extends under an unexcavated portion of the house for a distance of about 6 ft. to heat a small bedroom. Although the pipe rises directly from the furnace to the register, we do not get any heat in this room even in moderately cold weather. There is no cold-air return from this room and leaving the door open seems to make no difference. Floor joists are about 18 in. from the ground and there are screened air vents in the foundation. Will insulating this pipe help, and how do I do this?

G.B.—Topeka, Kan.

A—Of course, variations in temperature will tend to prevent passage of warm air through the pipe. Probably cooled air from the "cold" portion of the pipe extending under the floor of the room is finding its way back to the furnace. Insulating the pipe would undoubtedly help but we doubt if heat would be delivered to the room in the amount desired. A better plan perhaps would be to shorten the pipe and reinstall the register on the wall of the room nearest the furnace, if this is possible. Whether it would be advisable to rearrange the cold-air returns after making this change would depend on the way in which the heating plant is installed. If it is comparatively easy to get at the pipe to install a blanket-type insulation, it very likely would be worth a trial as the cost of the material would be negligible.

Removing Coating On Chimney



Q—I have an inside chimney extending up from the basement. A white crystal-like coating forms repeatedly from about 3 ft. above the floor up to where the smoke pipe enters the chimney. What is this and how can I eliminate it?

C.E.—Flint, Mich.

A—This is commonly known as efflorescence and is caused by the presence of soluble salts in the masonry materials. Moisture dissolves the salts, which are then drawn to the surface by a slow evaporation. In your case, it seems likely that moisture condenses in the lower portion of the chimney during the summer months and is absorbed by the bricks and mortar. Heat from the furnace causes the moisture to evaporate slowly. It may be that there is an accumulation of soot bridging the flue at a point just below the opening where the smoke

(Continued to page 250)

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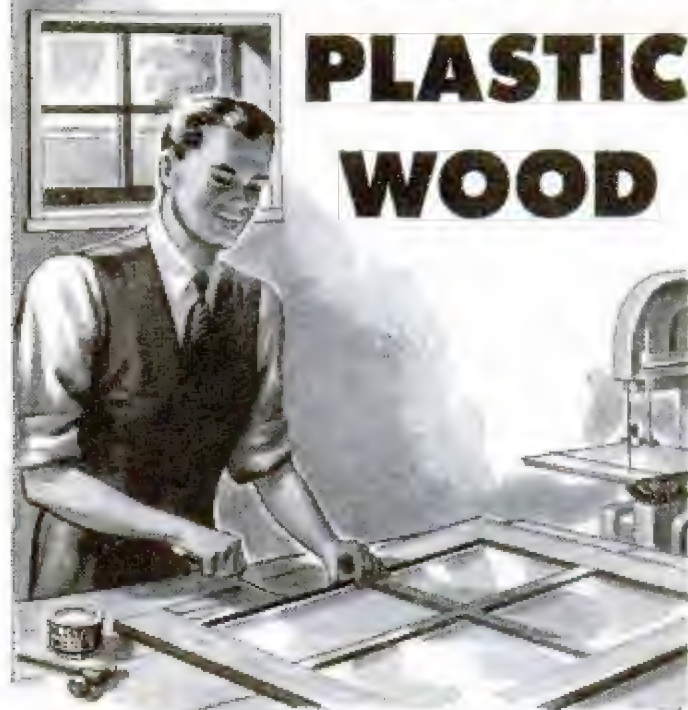
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pipe enters the chimney. Be sure that the flue is clear of soot at this point. If there is no cleanout, it's a good idea to install one. Coating the affected surfaces with zinc sulphate or white asphaltum generally will prevent a recurrence of the trouble. Go over the whole affected surface thoroughly with a wire brush to remove all the crystal coating and also any loose sand in the mortar joints before applying either of these materials.

Cleaning Sink Drain

Q—I recently purchased a small home in which the kitchen sink is installed on the side opposite the bathroom, making a long drain from the sink to the soil pipe. This drain is clogged, allowing only a trickle of water to pass through. How can I clean this long drain?

J.D.—Seattle, Wash.



A—One easy and effective way of clearing such a drain is first to remove the cleanout plug from the lower section only and then attach the garden hose to the laundry-tub faucet and adjust the hose nozzle to give a medium-wide fan spray. With the water shut off, force the hose into the opened end of the drain and as far back as it will go. Then turn on the water full pressure and withdraw the hose slowly, a few inches at a time. After clearing the lower section and withdrawing the hose, close the cleanout plug tightly and treat the upper section in the same manner, allowing the water to run at full pressure until it is certain that all the soapy material has been washed away. Flushing out the drain occasionally in this way will keep it clear. Incidentally, before screwing the cleanout plugs back in place, coat the threads quite liberally with pipe-joint compound. This will prevent leakage and also will make the plugs easier to remove.

Moisture Collects in Low Attic

Q—My home is only two years old and is built with a low-pitched roof. The attic floor is insulated with a fill-type insulation poured to a 3-in. depth between the joists. In winter, moisture collects on the underside of the roof boards just above the point where the rafters join the plates. The boards have warped quite badly due to the presence of moisture. What can I do to correct this condition?

B.W.—Kansas City, Mo.

A—Lack of adequate ventilation is probably the cause of your trouble. It is likely that the louvers in the gables are too small to admit sufficient air for proper circulation. The louvers may also be filled with leaves, and cobwebs or dust on the screen coverings may restrict the passage of air as much as 50 percent. Inspect the area where the moisture collects to see that the insulating material is not banked up against the roof boards at any point. Although you did not state the size of the louvers in your attic, it is a fair rule to allow at least 25 sq. in. (12½ sq. in. of each louver) per 100 sq. ft. of attic floor area.

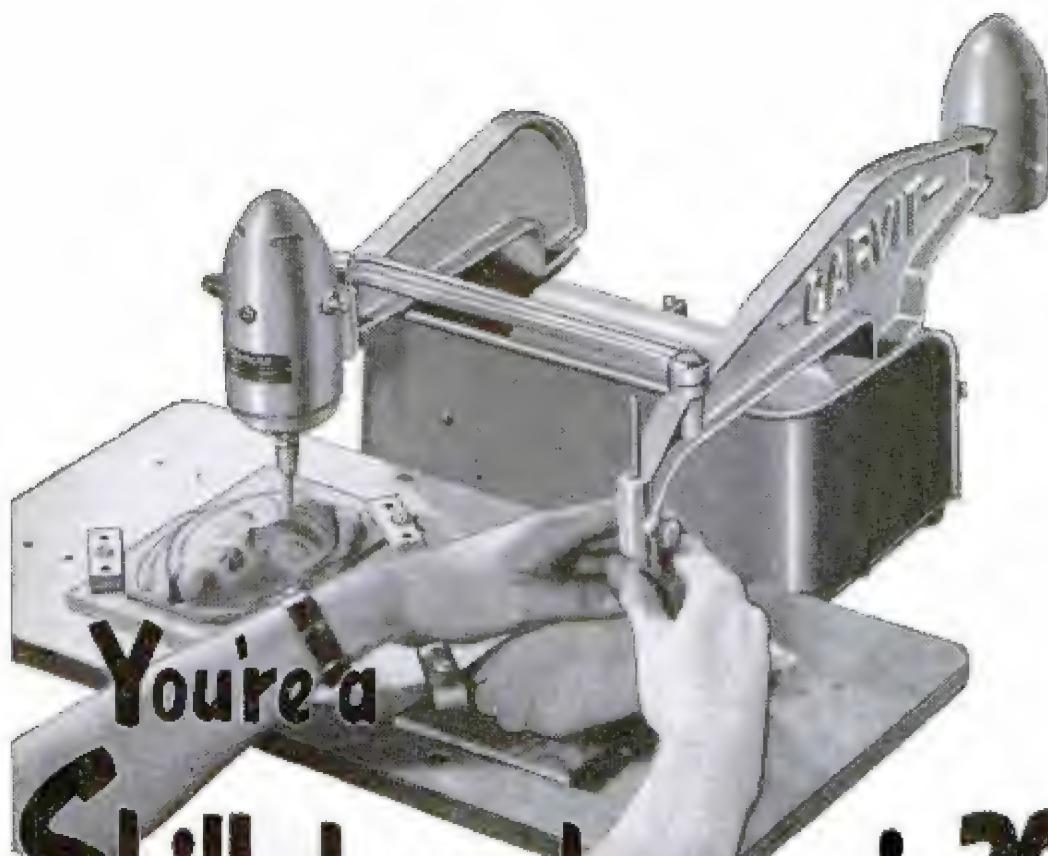
Removal of Ashes From Furnace

Q—Is there a method of removing ashes from the furnace ash-pit without creating a cloud of fine dust which settles over everything? Can you suggest a way of doing this disagreeable job without the necessity of building some mechanical device?

R.M.—Portland, Me.



A—After shaking the grates at the regular interval, level the bed of ashes and then add sufficient water to dampen them thoroughly. Should the ashes accumulate to a depth of several inches after shaking the grates, it will be necessary to wait a few minutes after adding the water to allow it to penetrate to the bottom of the ash bed.



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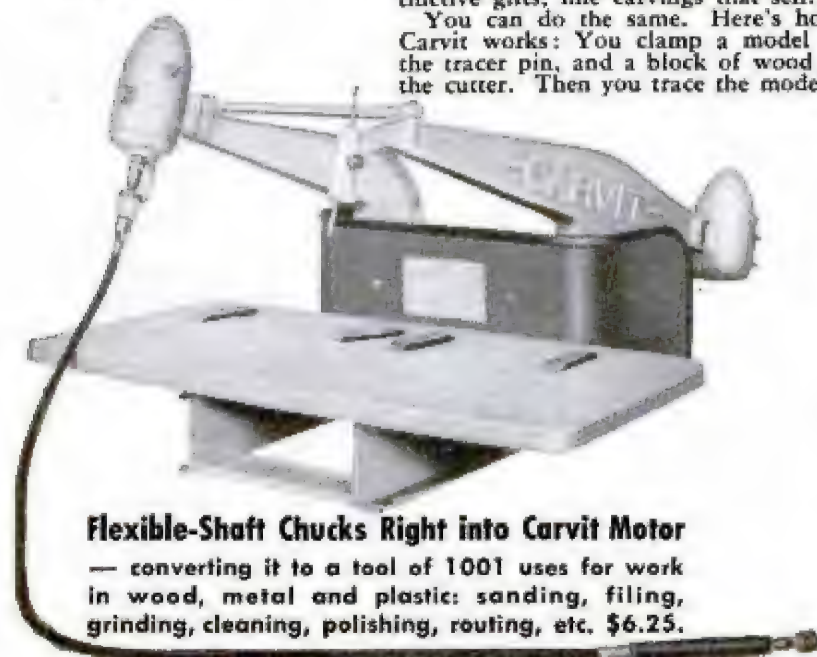
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showed the new-model pigs at the age of six months weigh 100 pounds more per litter than their common cousins, yet ate no more feed.

By juggling the laws of heredity, the animal engineers can speed up nature's slow processes a little, but many of the new designs are the result of experiments started long ago. For instance, while Germany was just beginning to cave in under Allied attacks, U. S. experts foresaw that Europe faced postwar famine unless her farm-animal population could be quickly rebuilt.

One of the quickest sources of meat is poultry. In the breeding pens at the government's Beltsville research center, experimenters were working to design a small, efficient turkey that would grow fast on an economical diet and would lay more eggs, with few that failed to hatch. They had already culled out inefficient, stingy layers in a new breed of turkeys. Just before V-J Day, they put a trial shipment of eggs from the "Beltsville Small White" flock on a plane bound for Europe.

Good heredity proved out, for 87.5 percent of the eggs hatched. The new design laid the foundation for a "high speed" turkey to help restock Europe's farms.

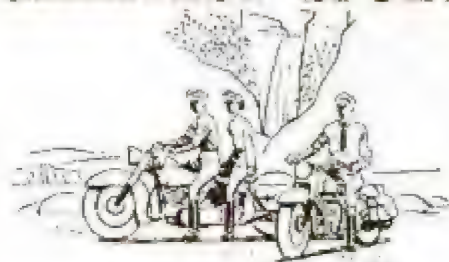
A small turkey recently designed by animal engineers is slanted for the U. S. market. Juggling the seasons, they have persuaded Madame Turkey to lay more eggs and to start laying them sooner. This is a long step toward better turkeys for Thanksgiving dinners, more fresh turkey meat throughout the year.

The animal engineers now are copying the revolutionary process that transformed yesterday's tall, top-heavy automobile into a long, low car with built-in running boards and smoothly streamlined body. Tall, long-legged steers mean more soupbones, when Americans want more T-bones. Farmers can profit by turning out a beef critter with shorter legs and a heavier build. Standardized animals mean fewer scrawny, cull cattle that are expensive boarders for the farmer, yet bring third-rate prices and yield tough, stringy steaks.

"No use feeding scrub animals!" the modern farmer says, for at today's feed prices, it doesn't pay to feed runts. By gradually breeding out the inefficient animals and replacing them with tomorrow's standard, up-to-date models, the nation's biggest industry is boosting its output to create more food for all. That's why tomorrow's farmer would no more want to turn out a runty, rawboned pig or a scrawny, thin-wooled sheep than a Detroit motor manufacturer would let an automobile leave his production line minus radiator grille or steering wheel.

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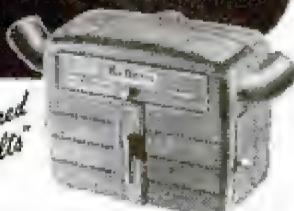


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Television Mountain

(Continued from page 156)

strip has been buried underground to connect the two towers with a water tank, various water pipes and other objects in an effort to help dissipate the discharges of lightning. Similar precautions have been taken by the other stations. Some of them have connected their ground systems together to obtain additional coverage. Most of the transmitting equipment is further protected by automatic relays that open instantaneously when overloaded, and by lightning gaps in the circuits.

The stations are served by a commercial power cable. In anticipation of power failures each station has installed stand-by motor generators, gasoline or diesel-driven, that start automatically and take over the load any time the commercial power supply fails. The little community of technicians is prepared to dig in no matter how they are cut off from the rest of the world and to keep their transmitters operating just as long as the beamed programs come up to them from Hollywood.

Here is the status of the Mount Wilson stations:

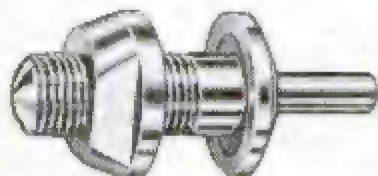
- KECA-TV (ABC) To begin operation in 1949.
- KECA-FM (ABC) Operating now from Culver City, moving to Mount Wilson this year.
- KFI-TV Now in operation.
- KFI-FM Now in operation.
- KFMV FM only, now operating.
- KHJ-FM (Don Lee-Mutual) FM station under construction.
- KLAC-TV Now in operation.
- KNBH (NBC) Television only, programs began early in 1949.
- KNX-FM 10-watt transmitter to be increased to 50 watts.
- KTLA Television station only, now in operation.
- KTSL (Don Lee-Mutual) Television station under construction, now operating from Mount Lee, Hollywood.
- KTTV (CBS-L.A. Times) Television programs began early in 1949.

That's the list of stations on the mountain at present. Half a dozen other FM stations have applied for construction permits and expect to obtain locations on Mount Wilson or close by. There are no additional open television channels allocated to the Los Angeles area, but if additional channels are opened for picture radio, still more TV transmitters probably will join the tight cluster of stations and tall towers on Mount Wilson.



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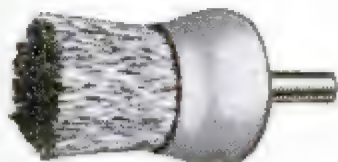
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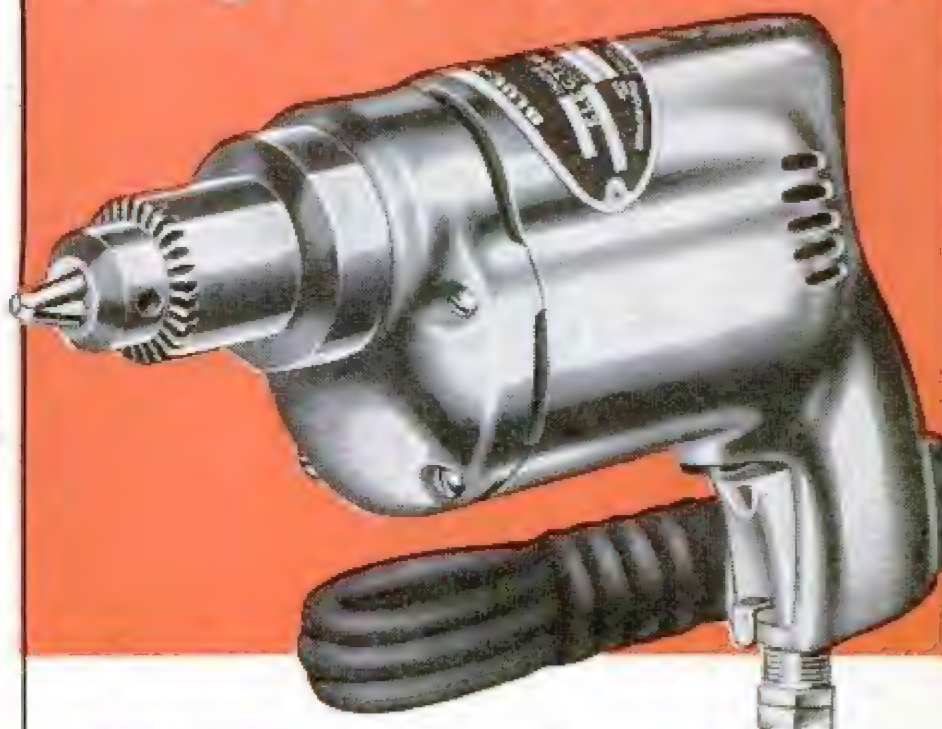
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King of the Mushers

(Continued from page 145)

comes to handling animals; others are not—and the dogs know it. Morgan Heap says that he once hired a sullen, morose driver to handle the Sun Valley dogs. From the very start, the animals didn't like this driver. At their first opportunity, they ganged up on him and tore his clothes off before he could be rescued.

A driver should be brisk and business-like when a team is working. Affection should be saved for later when the dogs are in their kennels. Even then, too much affection is not desirable. Punishment should be used sparingly—and only immediately after a dog has disobeyed a command. Most effective punishment is to grasp a dog's head between your knees, hold the head with your left hand and smack his nose smartly with your right hand. A whip should be used only by experts and only then to break up a fight between the dogs.

Often when traveling long distances across country, dogs become disinterested and ease up on their pulling. This necessitates "pepping them up." Snapping a whip, calling individual dogs by name or talking to them produces renewed alertness and energy. Often a bell on the lead dog will relieve the monotony. Some drivers also find that blowing a whistle helps.

Because of hard work and cold weather, sled dogs usually have a shorter span of life than other domesticated dogs. There are exceptions to this rule, however. A dog is at his best during the ages three to six years, and is retired around 10 years. Heap had one old blind dog that would still pull his weight when he was 14 years old.

Good sled-dog puppies cost from \$35 to \$50 apiece, while full-grown animals may vary from \$100 to \$150. A top-notch lead dog may cost \$250 or more. A sledge sells for \$350 or \$400, but many drivers prefer to build their own. Harness costs from \$50 to \$100 a set; but here again, many drivers have their own ideas and prefer to construct their own.

On the trail a dog usually can pull a load equal to his own weight. This may average around 100 pounds. On a packed slope with a down grade, a team can travel up to 30 miles an hour. On the trail, however, the average speed may be from three to five miles per hour—with a 20 to 25-mile day considered normal.

The world's record for speed and endurance among sled dogs was the famous dash from Nenana to Nome, Alaska, in 1925 to carry serum to that stricken community.

(Continued to page 258)

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NEW 1940 edition, 84 pages crammed with big selection of tools and materials for plastics, ceramics, hand power tools, plans, etc., etc. A gold mine of hard-to-find items such as foam rubber, kits, books and "How To" information. Every crafter should have a copy. Send 25c now to

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350 Cuts Per Minute—cuts them down, saws them up, one man operates. Thousands in use, stiff heavy blade, built to last, safety clutch control, uses power take-off any tractor. Low price, **OTTAWA MFG. CO., 2-927 Forest Avenue, OTTAWA, KANSAS**

BIG 3½" POWER BINOCULARS

Quality plus—yet priced to beat all competition. All metal with adjustable focusing wheel and shoulder strap. Tubes extend for sharp, instant view of distant objects. **SEND NO MONEY!** Clip ad and mail. We'll ship C.O.D. Check here to get handsome Carry Case only 50c extra. **Illinois Merchandise Mart, Dept. 2227-B, 1227 Loyola Ave., Chicago 26, Ill.**



BUILD YOUR OWN POWER LAWN MOWER

WHY BREAK YOUR BACK MOWING FIELD OR LAWN?

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Now anyone can save time and effort mowing field or lawn by building their own whirl type power mower. Build according to your own ideas and needs at small cost. Cut close to fences, walks, buildings, etc. Build in short time with parts and instructions we furnish. Save hours of time and back breaking labor. Write today for **FREE** information.

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BIGGER, BETTER 100% more power!



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MORE VALUE for your money

The Guild Disc Sander-Polisher lasts longer . . . does better work . . . because—(1) the extra powerful motor avoids stalling; (2) the high-load thrust bearing takes the overstresses and strains of heavy drilling, sanding and cutting—the kind of work that quickly damages ordinary tools.

The heavy ½" ball bearing spindle is super rigid for sustained true running. Takes screw-on attachments and a chuck for drills and stub-shaft accessories.

The big 6" disc is one full inch larger than usual disc tools . . . covers 53% more working surface.

Made of highly polished die cast aluminum. A beauty to see, a beauty to use.

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ALL THESE
TOOLS . . .
AND MORE!

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Sold by leading Hardware, Mill Supply and Lumber Dealers. Write today for name of your nearest dealer and detailed literature.

ALL GUILD TOOLS—Sander-Polisher, Saw, Belt Sander and Hedge-shear are precision built and guaranteed by Porter-Cable, makers of fine industrial and construction tools for more than 42 years.

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WOODWORKERS—CRAFTSMEN

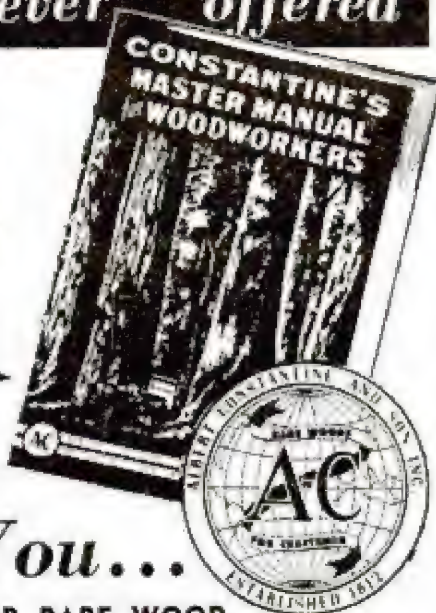
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CITY..... ZONE..... STATE.....

By relays of teams and drivers, the 665-mile distance was covered in 5½ days, an average of 125 miles per day under adverse weather conditions.

Aided by the zooming popularity of skiing during the last decade, dog-team racing is taking its place as a popular winter sport—both for the participant and the spectator. "Runnin' dawg" races are held during the winter months in Brighton, Utah; McCall, Idaho; Ketchum, Idaho; Aspen, Colo., and West Yellowstone, Mont. But the title meet for the whole country is the Ashton Dog Derby. The winner of that race rightly wears the crown of King of the Mushers.

Mining a Marble Mountain

(Continued from page 172)

be the proper size for that particular spot in the building.

When the block has been freed from its place in the quarry floor, it is hoisted onto a flatcar by derrick. The car runs along an underground railway to the quarry entrance. There it is hoisted out of the quarry by another derrick. At this point the block is washed to remove the marble chips and shavings. Its dimensions and identification numbers are painted on one face.

Because the Danby quarry is high up on a mountainside, the blocks have to be transported down into the valley where the railroad will take them to the mills. A cable-operated car takes the block down the mountain—a descent of 900 feet.

The block, still rough from the quarry-cutting operation, is hauled to the mill for trimming. The railroad runs right into the mill, alongside the giant gang saws. Still on a wheeled car, the block is rolled into a stall under horizontal saw blades. These blades have no teeth, but rather are smooth strips of steel locked under tension in the frame to cut the block to the proper size. When the block is to be cut into veneer, as many as 50 blades are locked in the frame at one time. These frames move back and forth in long, smooth strokes, rubbing the blades against the marble block. Cutting action results from the abrasion of sand and water ground into the marble by the steel blades. A pumping system pours the sand and water over the blocks. As the abrasive mixture runs down into the cuts, it wears away the marble slowly but smoothly. The saws run continuously, 24 hours a day, cutting two to three inches in eight hours. It requires about two weeks to cut through an average block.

The trimmed block or, in the case of veneer, the thin panel, is taken to a finishing mill, where revolving rubbing beds

(Continued to page 260)

GENIUS at WORK



12" DRILL PRESS



12" BAND SAW



SHOPMASTER TOOLS

***gives ease of operation
with professional results***

Whatever it is you make, a simple stool or an elaborate cabinet, it will contain that indefinable extra craft touch only you can put into it.

Most Americans have this ability to design and make things. They like to work with their hands. They know and take pride in good tools.

Shopmaster Tools have been designed to meet the needs of American craftsmen, both amateur and professional. Expertly engineered to give precise results with ease of operation, they have the rugged construction necessary for long years of service. And, best of all, they are priced within the reach of all.

See Shopmaster Tools at your dealer, or for free catalog, illustrated in full color, write to:

SHOPMASTER, INC.

1214 Third St. South, Minneapolis 15, Minn.

LATHE



8" TILTING ARBOR SAW



15" JIG SAW



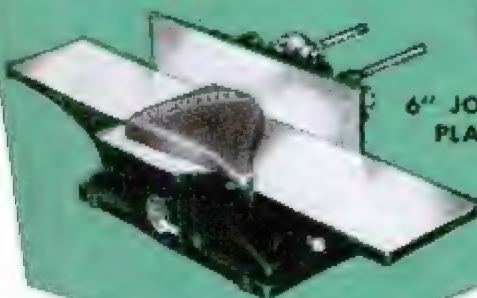
SABER SAW



8" TABLE SAW



6" JOINTER-PLANER



P.S. Simple, well-designed furniture and articles of wood regularly described in POPULAR MECHANICS are easy to build with Shopmaster tools.



**It's DANDY
HANDY.**

**A workshop
by itself!
Works wonders
around the house!**

**Every Home Craftsman Wants the
New BRADFORD TRIPLE TOOL**



**It's a SANDER!
It's a POLISHER!
It's a DRILL!
only \$48⁷⁵
complete**

Including 3 sanding discs, lamb's wool bonnet, backing pad, 78 Jacobs chuck with key and patented holder.

Here's the handiest portable electric tool yet made. In seconds you can change it from a 5" polisher, to a 5" disc sander, to a powerful $\frac{1}{4}$ " drill! Drills $\frac{1}{4}$ " in steel, $\frac{1}{2}$ " in hardwood. Drives numerous accessories. Polishes your car, woodwork, furniture, linoleum in a jiffy. Does all kinds of sanding, light grinding, wire brushing.

Precision-built of finest materials. 100% ball bearing. Powerful AC/DC motor. Helical cut hardened gears. Aluminum housing. Weighs only 6 lbs. Get it at your nearest Bradford dealer, or order now by coupon below. Write for illustrated bulletin.

Dealers: Write for our sales proposition.

**Bradford Machine Tool Company
671 Evans St., Cincinnati, Ohio**

Send me the Bradford Triple Tool complete with accessories. ☐ Money order for \$48.75 enclosed.
☐ Money order for \$12.35 enclosed, balance COD.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

**THE BRADFORD MACHINE TOOL CO.
671 Evans St., Cincinnati 4, Ohio**

grind the marble down to the precise size desired. These rubbing beds are huge cast-iron wheels revolving horizontally. From 12 to 14 feet in diameter, the wheels weigh 10 tons when new. Continuous grinding of the marble wears away these five-inch-thick wheels in about six years.

Again sand and water do the work. The abrasive mixture is fed onto the surface of the wheel as it spins. The marble is held by a giant clamp and is slowly ground down to size. When the rubbing operation is completed, the marble has smooth, square sides and can be used without further processing for exterior blocks.

But the interior marble, such as the thin panels, have another finishing process to go through. They are placed on racks under a polishing head. By using a variety of abrasive heads, the workman produces a mirrorlike finish on the stone. No sand is used here, only water and fine abrasive.

Colored marbles, some of which are quarried in the Lake Champlain region of Vermont, take a brilliant polish and come out of the finishing mill shining like a new car. These colored marbles are used today more than ever in buildings. It's a pretty good bet that the front on your home town's newest department store or theater is colored Vermont marble.

Another method of cutting marble, used in the finishing mills for final cuts in small blocks, is with the diamond saw. These saws are six feet in diameter and contain replaceable teeth studded with industrial diamonds.

Cornices and moldings are produced on a planer very similar to the type used in metalworking shops. Lathes are used for cutting circular columns and decorative pieces such as urns.

But not all the marble can be cut by machine. Much of the marble used today is in the form of statuary and other delicately carved shapes. Skilled artisans turn the inanimate stone into beautiful statues with their chisels.

Years ago, the marble cutter fashioned his delicate carvings with a chisel and mallet. Today the pneumatic chisel does the job quicker and more precisely. The cutter can't afford to make a mistake, because there's no way to cover up a missing piece of stone.

Marble has been a favorite building material for centuries. Some methods used in mining and finishing the sparkling stone are the same as those used in ancient Greece and Rome. There are modern innovations, such as the use of electric power and pneumatic drills, but basically the techniques are unchanged.

PRESTO! MASTER GLAZE



Car Owners! Meet Master Glaze—the sensationally different luster for new and used cars! Not a wax—not an oil polish—not a paint!—nothing that “smears” over the surface.

MASTER GLAZE is a unique discovery—a creamy liquid—quick and easy to apply! Gives a hard, glass-like surface. Even gasoline cannot dull it! Lasts six months to a year! Amazing luster—beautiful, sparkling clean and brilliant! Doesn't finger-mark—doesn't smear! A match box full glazes an entire car. Seals the pores—protects! **NOTHING LIKE IT!**

AGENTS

An unusual opportunity! Quick, flashy demonstrator. Big profits. Good territory. Write today!

FREE SAMPLE

Just send your name and address to

MASTER GLAZE CO., 7720-660 W. Harwood Ave., Milwaukee, Wis.



NOW! FILE YOUR OWN SAWS

Do expert saw filing at home. Precision filing easy without experience. Two simple adjustments. Keeps any hand saw extra sharp and true-cutting. Complete with file. Money back guarantee. Cash with order, prepaid. (COD postage extra.) Order today.

THE SPEED CORP., Dept. PM1

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LUMBER

A BOARD OR A CARLOAD

Harold Hunt wants to send you big, new No. 15-B Catalog. Over 148 pages of woodworking ideas. 12 pages of rare woods in colors. **UNEQUALLED BARGAINS** in imported and American woods, supplies, hard-to-find hardware. Send only 15c to cover postage and handling.

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TOP GRADE KILN-DRIED

WALNUT
MAHOG
CHERRY
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AROMATIC
RED CEDAR

FOR
LOWER COST
**HOME
MOVIES**
BUY DIRECT
AND
SAVE WITH
SOLAR

8mm-16mm MOVIE FILM
FAVORITE OF FANS SINCE 1937
24-HR. FREE PROCESSING
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Describes all types of **SOLAR**
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REAL DIESEL ENGINE

\$2.95



WE'RE CRAZY, they tell us, giving away a real diesel engine, complete with cylinder and piston, carburetor, crankshaft and connecting rod. All parts completely machined, ready for easy assembly. **ONLY \$2.95**. How do we do it? We're selling thousands of **DEEZILS**. So production's up; costs tumble down. **DEEZIL** is a precision engine. Actually runs at 7500 RPM. Produces 1/7 HP.

Ideal for planes, boats, midget cars. Send \$2.95 plus 25c postage today.

GOTHAM HOBBY CORP.

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Dept. "P"

YOU'RE NEVER OUT OF WORK

when you have a
sideline business
to fall back on

- STEADY, PROFITABLE INCOME
- NO EXPERIENCE REQUIRED
- BE YOUR OWN BOSS



IN YOUR SPARE TIME—AT HOME SHARPEN LAWNMOWERS on the IDEAL SHARPENER

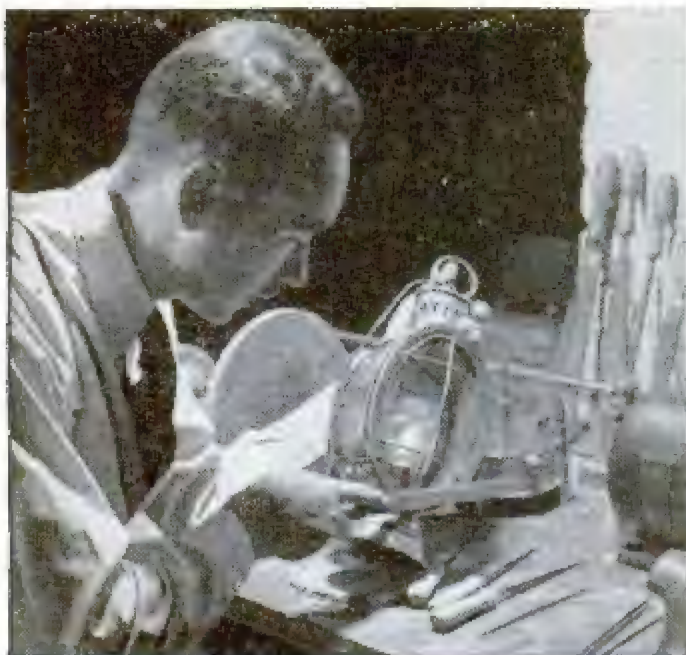
YOU can put one of our IDEAL Lawnmower Sharpeners in your cellar or garage and start a good paying business of your own—on the side—sharpening lawnmowers. In a short time your earnings will pay for the machine. From then on, everything you take in is “gravy.”

Get started now! Early this spring and all summer, people in your neighborhood will keep bringing you mowers to sharpen. Just place the lawnmower in the IDEAL, make a few simple adjustments! The IDEAL does the rest. You collect the cash! Get the facts! Be first in your neighborhood!



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FREE
booklet today!

THE FATE-ROOT-HEATH CO.
DEPT. D-3, PLYMOUTH, OHIO



the FINISHING touch

It's the finished appearance of the job that counts. So, for those few final touches, you'll want the best in finishing tools.

In finishing files, that means Nicholson or Black Diamond. Here are a few of them, with the cuts and sizes recommended for home-workshop use:

Mill File—2nd or Smooth cuts in 6- to 10-inch lengths.

Hand Finishing File—2nd or Smooth cuts, 12-inch length.

Brass File—8- or 10-inch length.

Swiss Pattern Files—in a variety of shapes, sizes and cuts for extra-delicate work. Ideal for the model maker; Round Handle Needle files in boxed sets.

A popular, work-bench assortment of Nicholson or Black Diamond files will prove a prized possession. Your hardware dealer can supply you.

• Write for "FILE PHILOSOPHY"—a free book on the kinds, care and uses of files.

NICHOLSON FILE COMPANY
22 Acorn Street
Providence 1, R. I.
(In Canada, Port Hope, Ont.)

NICHOLSON
U.S.A.
MADE IN U.S.A.

NICHOLSON
FILES FOR EVERY PURPOSE

Uncle Sam's Stamp Factory

(Continued from page 103)

cutting is done in soft steel and the design appears in reverse.

The next step is to decide on color. A call goes out to Herbert C. Tucker, superintendent of the ink-making division, for "pull out" proofs (actually dabs of color) in several dozen shades. All of the stamp inks are especially made for steel-engraving work and Tucker keeps approximately 150 colors on hand. The bureau buys pigments under very rigid specifications, operating its own testing laboratory and production lines of mixing, grinding and blending machines. All samples are matched against standard samples for color and consistency. The ink-making department, a complete factory in itself, produces 3,000,000 pounds of ink a year for both currency and stamps. All formulas are secret.

Working with the various samples of ink, proofs of the new stamp are made from the master die. These proofs, known as die proofs, are submitted to the Postmaster General who selects the desired color. Then the master die is hardened. This is done by heating the die in a cyanide solution to a cherry red at 1400 degrees Fahrenheit and then quickly cooling it in a brine bath. The hardened master die then goes to the transfer department where it is placed in a transfer press. Under heavy pressure this press transfers the cutting on the die to the outer rim of a soft-steel roll. After hardening, this roll is used to transfer the design to the steel plates from which the stamps are printed. The plates are also hardened and if they are to be used on rotary presses they are bent to fit the cylinders.

Generally, only four plates are made for the special commemorative stamps. The ordinary three-cent stamp has about 60 plates while only 30 plates are required for the other ordinary stamps. The bureau has eight sets of plates available for the five-cent airmail stamp.

The men working in the transfer department, whose business it is to reproduce engravings on steel, are known as siderographers. There are only 55 siderographers in the United States and nine of them work in the bureau.

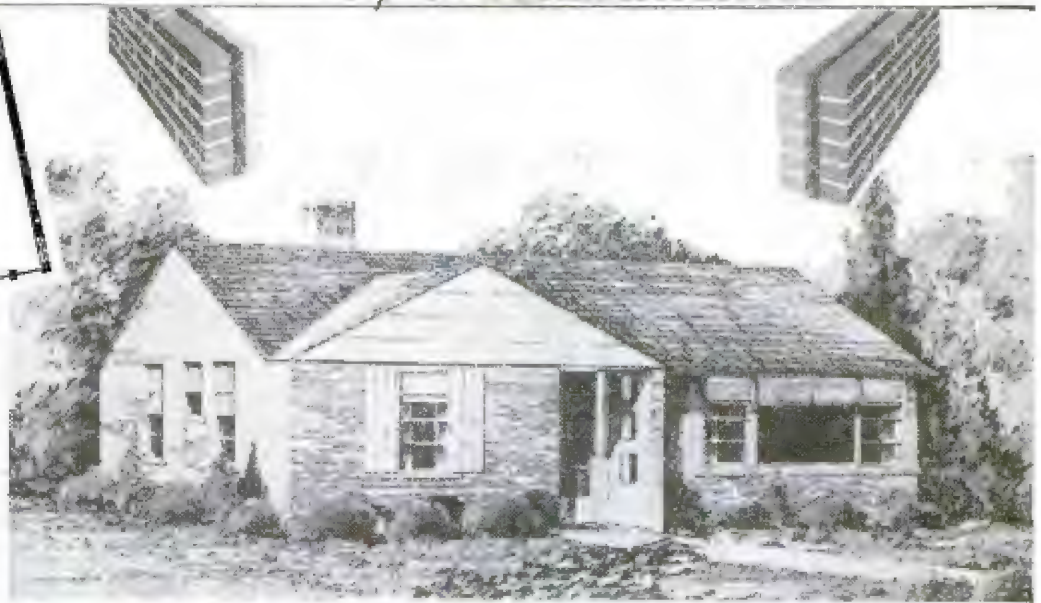
Printing of the stamps is under the close supervision of Jack M. Smith, superintendent of the postage-stamp division. Any tour of inspection through this department is under the watchful eye of the Secret Service. Every sheet or roll of paper

(Continued to page 264)

The "New Look" in Masonry is **STREAMLINED**



37' x 24' 936 Sq. Feet
Authentic Ranch Type
Especially Designed
for Dunstone



*National Average. May vary according to locality.

\$336³⁴*

Buys ALL the Dunstone for the "AMERICANA" Outstanding Low-Cost Masonry Home

Dunstone is $2\frac{1}{4}" \times 3\frac{3}{4}" \times 16\frac{1}{2}"$ —twice the length of ordinary brick.

Exterior with the laid flat, interior on edge, forms 8" cavity wall including 2" air space.

Both exterior and interior laid flat form 10" cavity wall with 2" air space.

Supplied in reds, buffs, tan, etc. for exterior. Natural grey for back-up when plastering is intended. Also supplied in pastel shades to form a self-contained interior finish.

Every Dunstone is absolutely square, straight and symmetrical. No warping, no distortion. Makes for easier laying and cleaner "streamlining."

The manufacture of Dunstone is an outstanding manufacturing opportunity. If interested in establishing a local plant write for informative book "Blueprints for Profit."

Here's a Dunstone message for those intending home builders who are masonry-minded but cost-cautious. Who want walls built of brick but refuse to pay the customary price penalty.

Dunstone is America's finest masonry. But costs less than lumber. It is brick brought up to date—streamlined and styled to fit today's needs.

You don't have to build according to the plan shown in order to use Dunstone, because Dunstone gears with any plan and with any kind of construction—residential, commercial and industrial. But the "Americana" does give you an idea of Dunstone economy, beauty, modernity and adaptability.

Dunstone is made in a chain of local plants, each using local materials and labor. Therefore, the two biggest cost items in the price of ordinary brick—freight and distribution—are practically eliminated, and the saving is split two ways: improving the quality and lowering the price.

Contact your local Dunbrik-Dunstone plant. See the product and get an estimate on Dunstone for the home you are planning to build. You can also get—if you want them—a set of blueprints on the "Americana", (Price \$15.00). If your city has no Dunstone plant at present, write us direct for descriptive literature.

W. E. DUNN MFG. CO., 610 W. 24th St., Holland, Mich.

DUNSTONE



With **CASITE** in
your car

● Just press the starter—and whoosh—your car will go on coldest winter mornings.

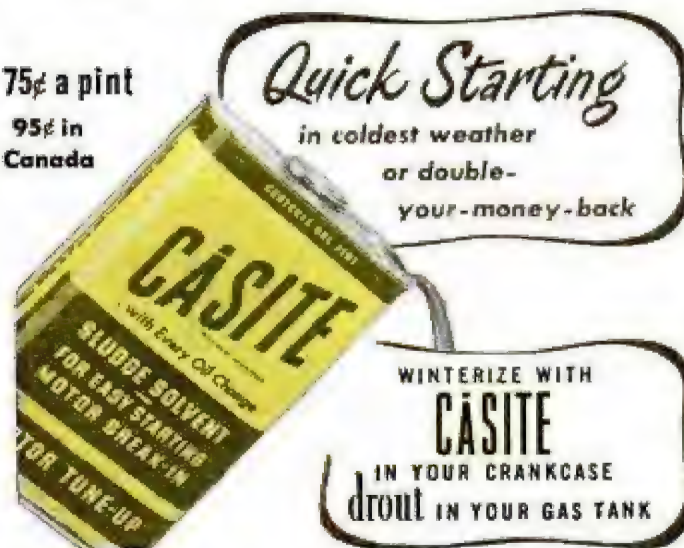
Just relax—you'll keep going briskly, steadily—you'll get that smoother, sweeter performance you've been looking for.

And thousands of miles from now, you'll still have plenty of power. Casite cuts engine wear because it improves lubrication. No matter what kind of motor oil is used, Casite gets it around quickly and into the tight spots. Get Casite and go!

THE CASITE CORPORATION, Hastings, Michigan
CASITE DIVISION, Hastings Ltd., Toronto

75¢ a pint

95¢ in
Canada



used in the printing or proofing must be accounted for later, either in the form of finished stamps or scrap which is sent to an agency of the Treasury Department for verification and destruction by burning. There is no wastepaper to be thrown away here where any scrap might be a priceless collector's item.

Most of the stamps are printed on the nineteen large and nine small rotary presses. These presses were designed by a former employee, especially for the job. Each press can turn out about 7800 sheets a day. If the sheets are for the ordinary variety of stamps they will contain 400 stamps each; if for coil stamps (used in coin machines), only 170, and if for the book stamps, 360. The majority of the commemoratives are printed 200 to a sheet. The approximate number of stamps turned

1948 COMMEMORATIVE STAMPS

George Washington Carver	Palomar Mountain
Discovery of Gold	Observatory
Mississippi Territory	Poultry Industry
Four Chaplains	Gold Star Mothers
Wisconsin Centennial	Fort Kearny
Swedish Pioneers	Volunteer Firemen
Progress of Women	Indian Centennial
New York Golden	Rough Riders
Anniversary	Will Rogers
William Allen White	Fort Bliss
U.S.-Canada Friendship	Moina Michael
Francis Scott Key	Juliette Low
Salute to Youth	Gettysburg Address
Oregon Territory	American Turners
Harlan Fiske Stone	Society
Clara Barton	Joel Chandler Harris

out by a single press in one day is 3,120,000. The total value of stamps turned out in a day varies, but on many days the figure runs close to \$4,000,000.

Printing is also done on flat-bed presses for stamps of limited demand. Examples are the Canal Zone stamp and stamps of high denominations such as \$1, \$2 and \$5.

As the long web of stamps rolls from the rotary presses it passes through a gumming machine and an electric drying chamber. Here the gum is hardened in 30 seconds. This vegetable gum is not to be confused with glue and—stamp lickers please note—is said to be as pure and edible as the best food. At the end of the drier the sheets are wound into big rolls.

The rolls are moved along to machines which perforate the stamps in both directions and cut the rolls into sheets of 400 or 200 stamps each, depending on the size of the stamps. These perforating machines are electronically controlled. Register marks are engraved on the printing plates and appear on the sheets of stamps in the form of dashes. These dashes are scanned by an electric eye to hold the

(Continued to page 266)

The Amazing ELECTRIC FAUCET HEATER that gives

Now! HOT WATER from your COLD WATER FAUCET!

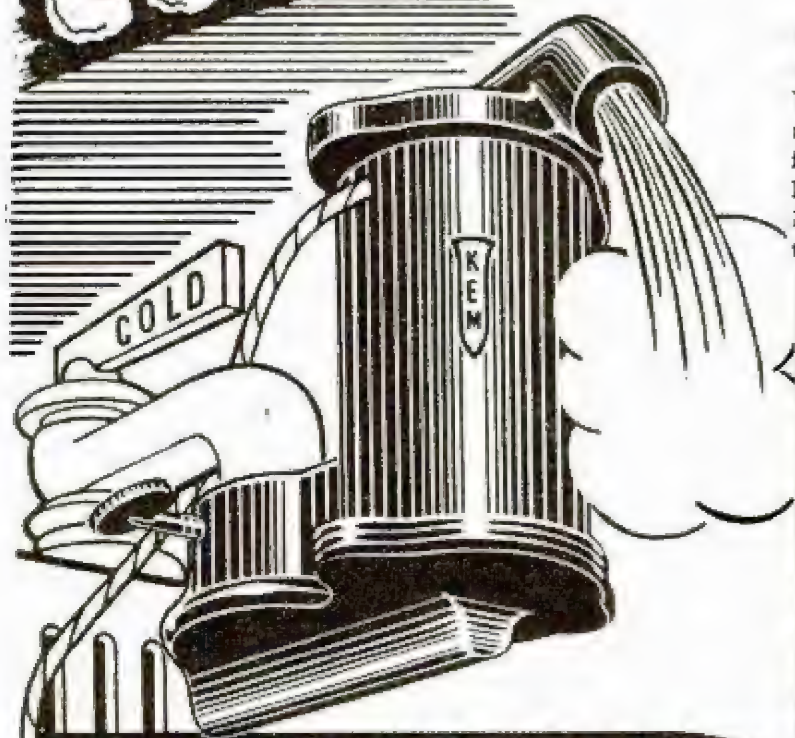
-in a Jiffy!

24 HOURS A DAY!

Think of it! THE HOT WATER YOU WANT—the moment you want it—from any sink cold-water faucet... just by plugging Kem's amazing new Faucet Heater into the nearest electrical outlet. No boiler or tank needed! No fussing with fires. Attached in a jiffy—takes seconds to attach or remove.

You merely turn faucet to regulate temperature.

- For SHAVING early in the morning and late at night
- For BABY'S BOTTLES
- For use in SICKROOM
- For quick LAUNDERING
- For use in FACTORY, SHOP AND STORE
- For GARAGE, BASEMENT, etc.
- For FARMS, BUNGALOWS and COTTAGES that do not have regular hot water supply or where not readily available
- When HEATING PLANT BREAKDOWN stops hot water supply



Worth many times its special

ADDITIONAL FEATURES

- Operates on AC or DC current
- No moving parts to wear away or get out of order
- Constructed of handsomely finished aluminum
- Weighs less than 1 pound (size 2 3/4 inches x 3 3/4 inches)
- Underwriter Approved 6-foot extension cord
- Costs little to operate a day

low price
of only

\$3.98

FULLY GUARANTEED!

The Kem Electric Faucet Heater is skillfully made and guaranteed against any and all defects in material and workmanship. With ordinary care it will give years of satisfactory service.

You're never without hot water when you own a Kem Electric Faucet Heater. Get one now at the amazingly low cost of only \$3.98. Mail coupon TODAY!

KEM COMPANY

18 East 41st Street, Dept. 3-Z, New York 17, N. Y.
WRITE, COME IN OR CALL LE 2-4181—8th FLOOR

KEM COMPANY, 18 East 41st Street, Dept. 3-Z, New York 17, N. Y.

- ☐ Rush KEM HOT WATER HEATER C.O.D., I'll pay postman \$3.98 plus postage.
☐ Enclosed find \$3.98. Send POSTPAID.

NAME.....

STREET.....

CITY.....ZONE.....STATE.....

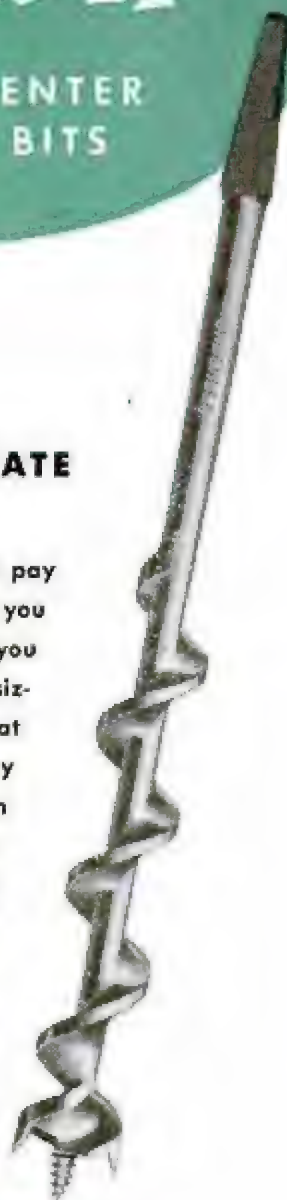
(PLEASE PRINT)

MAIL COUPON TODAY!



FOR FAST, ACCURATE WORKMANSHIP

GREENLEE 22 is a name it will pay you well to remember whenever you buy Auger Bits. For it assures you sharp cutting edges, accurate sizing, bright, high finish, and that smooth, easy action so necessary in fine craftsmanship. You can be certain, too, that every GREENLEE 22 Solid-Center Auger Bit is "factory sharp" when it reaches you. For each is "Plastic-Sealed" with a special protective coating to keep it in perfect condition for you. To buy top quality, buy GREENLEE.



SPECIAL OFFER... ONLY 10¢ FOR HANDY WOODWORKING CALCULATOR

Quick solutions to countless woodworking problems. Just set dial: convert linear feet to board feet; compare characteristics and workability of various woods. Also shows bit

sizes; nail specifications; tool sharpening hints; etc. Heavily varnished cardboard, 6" diameter. Send 10¢ to Greenlee Tool Co., 2102 Columbia Avenue, Rockford, Illinois, U. S. A.



paper in proper position. Formerly, this adjustment was made manually which resulted in many mutilated stamps.

Every sheet is examined once and counted twice. Where flaws occur it is possible to salvage as little as a quarter of a sheet, the defective portions going to the furnaces after being checked by the section of mutilated paper. The inspected stamps form units of 100 sheets each. The 100-sheet units are stapled in four places on the margins and then cut into quarter sheets, the size for delivery. These big "books" hold 10,000 stamps of the ordinary size and 20 books make a large package of 200,000 stamps. One of these packages, which is about a cubic foot in size, is worth \$6000 if the stamps are of the three-cent denomination. Armored trucks carry the packaged stamps daily from the bureau to the Washington, D. C., Post Office.

Stamps sold in post offices in book form go through a slightly different procedure. They are stitched in booklets containing 12 or 24 stamps. The stamps for dispensing machines are wound into coils of 500, 1000 and 3000 stamps.

There are almost as many regulations in regard to the printing of any matter pertaining to stamps as there are to currency. It is illegal to reproduce a stamp (to illustrate an article such as this) unless the stamp is less than three fourths of actual size or more than 1½ times actual size. One company recently decided to send out in an advertising brochure a full-color reproduction of all the 1948 commemorative stamps. The Secret Service, which guards the Post Office Department, went into immediate action. The brochures were confiscated and so were the plates from which they were printed and action in the federal courts was threatened. That company learned the hard way that Uncle Sam is mighty particular about anything concerning his stamp factory.

'49 Uranium Rush

(Continued from page 93)

radium, for counting cosmic rays, for making measurements to safeguard public health in places where radioactive materials are used, and for prospecting, among other uses. Usually, the meters are designed for one special use and may be adjusted to various degrees of sensitivity.

Untrained prospectors have been wildly excited when first trying out their meters because the instruments immediately start to indicate radioactivity. This is due to the reception of cosmic rays and the

(Continued to page 268)

Mows and Trims Lawns



In One Simple
Easy Operation
8 1/4 Lbs.

Save Time
and Labor with a

MONTAMOWER

New model. New type metal handle has special device to adjust cutting height. Drive shaft now mounted on free rolling, factory lubricated, sealed ball bearings. No tired backs or aching arms. 8 1/4 lbs. live precision made mechanism that first gathers, then cuts smoothly a clean 16" swath through grass, dandelions, spike grass, lawn weeds. No noise or clatter. As modern and efficient as your electric razor. Cuts right up to walls, fences, trees or posts; leaves no fringes to be trimmed by hand. Cutters self-sharpening. Built to last many years. Many thousands in use. Sold direct from factory for 28 years. Costs little. Write at once for trial on your own lawn "approval offer," guarantee information and literature.

MONTAMOWER DISTRIBUTING CO.

92 Keeler Bldg.

GRAND RAPIDS 2, MICHIGAN

GIVES YOU 2 DRILLS IN 1



Converts any 1/4 inch Electric Drill to 1/2 inch capacity. Reduction gears reduce speed 5 to 1, the average speed of 1/2 inch Drill thereby increasing power.

Jobbers write Price **\$11.95**
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G. M. CO. MANUFACTURING, INC.

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You're a Better Driver With a HULL AUTOMOBILE COMPASS

When you're sure of directions, every second, you're relaxed, undistracted, a better driver. Beaconlite illuminated \$5.95, Streamline standard \$3.95. At your dealer's. Write for literature.

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WORK GLOVES

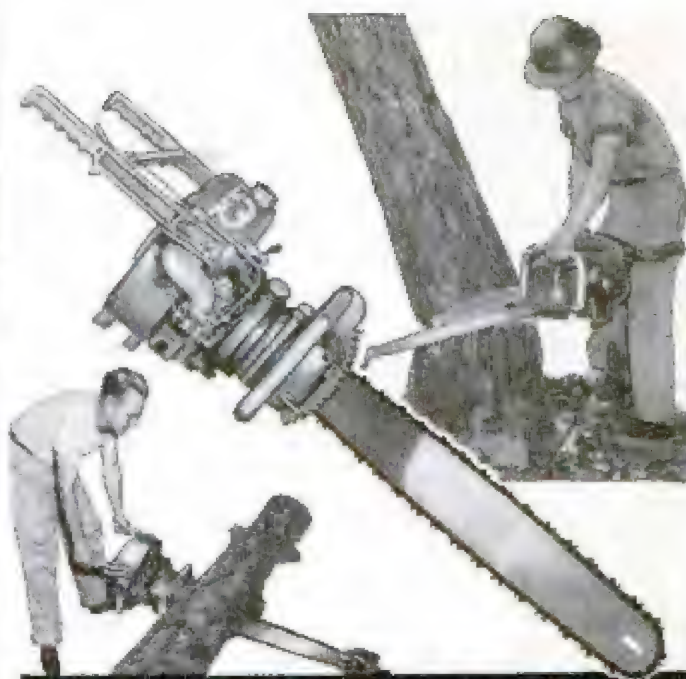
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Riegel makes the
right glove for
every job.

Riegel Textile Corp.
342 Madison Avenue
New York 17, N. Y.



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The Best Cutting Lightweight Chain Saw on the Market!

MODEL 10

Mall CHAIN SAW

FOR ONE OR TWO MAN USE

Saves time and Effort Felling, Bucking, and Limbing Trees; Cutting Fence Posts, Cordwood, Cross Ties and Firewood.

The Mall Tool Company - pioneers in designing, engineering and manufacturing Gasoline Engine, Electric and Pneumatic Chain Saw - climaxes its years of experience with this powerful, new lightweight gasoline engine Chain saw that incorporates important money-saving features not available in other makes of chain saws.

Easily handled by one man on horizontal, vertical or any angle cut • Indexed to any desired angle for felling or bucking • Lightweight die-cast magnesium construction makes it easy to carry • Powerful 2-cycle Gasoline Engine • Interchangeable Gear Ratios - slow speed for big trees, high speed for small ones • Round Nose Bucking Bar makes it possible to start cut with tip of round end; also permits felling and bucking trees twice the bar's length • Foolproof float-type carburetor keeps engine running for angle cuts • Speed Control by Throttle on right handle and on handle cross-bar (for one-man operation) • Quick detachable tailstock furnished with round nose bucking bar at no extra cost.



MALL Model 10 CHAIN SAW

Capacity	Weight	Price
18 inches	52 lbs.	\$380.00
24 inches	56 lbs.	385.00
36 inches	61 lbs.	395.00
48 inches	67 lbs.	405.00

F.O.B. Chicago

Write for free literature, demonstration and name of nearest dealer. Sales and Service Stations throughout the United States.

MALL TOOL COMPANY

ESTABLISHED 1921

7805 S. Chicago Avenue

Chicago 19, Ill.

normal radioactivity of the earth. A meter is apt to register from 5 to 50 random clicks a minutes and this so-called background must be disregarded when seeking radioactive materials. Before starting out it is best to count the clicks for 10 minutes and divide by 10 to establish the actual background count for any locality.

For normal prospecting the meter is simply carried across country or past likely formations at a slow walk while the operator listens or watches for any unusual change in the gamma-ray count. Variations in the count are apt to occur during a prospecting tour and the operator soon becomes familiar with these. Spurious counts, for instance, may be noticed at the approach of a thunderstorm. The normal background count is apt to fall off sharply when a gulley is entered. Contamination of the clothes by radioactive materials also can cause a count that has no significance as far as prospecting is concerned. When in a known radioactive locality it is best to walk very slowly to watch for any unusual changes in the count. Three feet of earth overburden or rock capping can almost completely shield a vein of material that would give out a very rich count, if it were exposed.

Careful prospectors who pick up an indication of radioactive ore use their meters

for surveying the extent of the deposit, exposed or unexposed. They mark the area off into 20-foot squares and post a stake or pile of rocks at each intersection. At each corner they then take a one-minute stop-watch count and mark the count on a grid map. If a vein of radioactive material lies below, the completed grid map immediately reveals its length, breadth and direction.

The Geiger counter is a dependable detector of radioactive materials but it is useless or virtually useless for estimating the richness of an ore. Even common country rock may cause an increase in the count if a sample is held close to the tube, due to the trace of radioactivity that the rock contains. The only sure way of learning the uranium or thorium content of a specimen is by spectroscopic analysis.

The Geiger-Mueller radiation meter is the most popular tool for uranium prospecting but it is not the only one. Unexposed photographic film left for a day or two in a light-tight container on a possible body of uranium material will be found to be fogged when developed if the deposit was truly radioactive. Various types of electroscopes give an indication of radioactivity when such an ore is examined

(Continued to page 270)

GROBAN'S—WAR SURPLUS BARGAINS

SCOOP!

Brand New

High Volume CENTRIFUGAL PUMP



FOR FIRE PROTECTION, IRRIGATION, DE-WATERING,
INDUSTRIAL USES, FARM USES, ETC.

**PUMPS RATED 500 GALLONS PER MINUTE AT 275 FT.
HEAD PRESSURE**

Equipped with 1 1/2" diameter straight splined shaft for direct coupling drive; 4 1/2" threaded suction intake; two—2 1/2" threaded discharge outlets; Hale Pump Co. Model CF volute type; requires 37 H.P.; dimensions: 21" x 24" x 28". Complete with full accessory kit including suction and pressure gauges, priming equipment, and instruction book. Ship. wt. 415 lbs.

Gov't. acquisition
cost \$425.00

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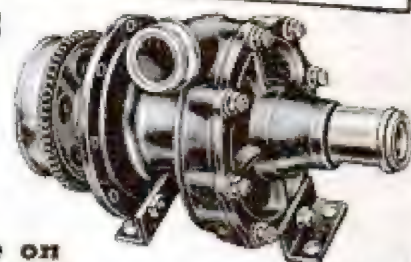
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Ready for use on
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Belt Driven — Centrifugal Pump

- Use it for:
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- HOME WATER SYSTEMS
- FIRE PROTECTION
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- DRAINING PONDS, TANKS, etc.
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An extraordinary value for all types of intermittent or continuous pumping in the home, farm, factory. Built to exact specifications of Packard Motor Car Co. for use in Buick-Royce Merlyn Aircraft Engines. May be run with electric motor, gas engine or power take-off on tractor. Delivers up to 25 gallons a minute with 1/4 H.P. motor; 80 gal. a min. with one H.P. motor. Will deliver up to 44 ft. head or 25 ft. suction. Use 1" outlet hose; 1" or 1 1/2" inlet hose (recommended).

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WITH PUMP**

Has cast aluminum housing, accurately machined 5" bronze impeller; 3 1/2" V belt pulley and mounting brackets. Shaft rotates on ball bearings; has grease gun fitting.

Original cost approx.
\$88.00. Shipping weight
10 lbs. A REAL BUY.

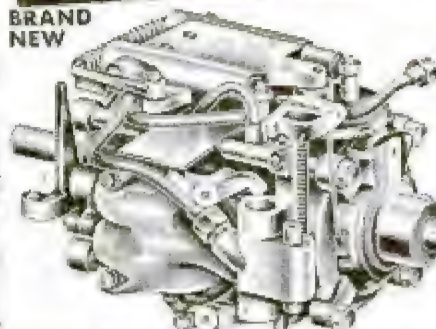
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Gov't. Acquisition
cost, \$300.00
Use it on chain saws,
midget autos, lathes,
drills, power machin-
ery, chucking machines,
farm machinery,
potters' wheels,
tractors, trucks,
etc. Ideal as hy-
draulic torque con-
verter.

Contains hydraulic
pump and hydraulic
motor; has reversing

controls. Designed for use on 2 ton 40 mm anti-
aircraft guns; contains 10 ball bearings and high
quality precision workmanship, made to exacting
specifications of ordnance department. Overall di-
mensions: 12" long x 5 1/2" wide x 6 1/2" high.
Ship. wt. 19 lbs. Complete engineering report
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Compact, powerful, rated 1,000 P.S.I., 507 cu.
in. per revolution, 8 gal. per min. at 1750 r.p.m.
Change rotation by reversing flow. Delivers up to 6
H.P. BRAND NEW. Requires 1/2 to
1 H.P. to drive directly or by pul-
ley. Wt. 4 1/2 lbs. \$60.00 value for

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Postpaid
Brand New CHECK and
RELIEF VALVE. Adjust-
able for any pressure. . . **\$2.95** post-
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Self-Priming ELECTRIC PUMP

APPLICATIONS: oil burn-
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MOTOR MFD. BY BLACK & DECKER: double ball bearing series
wound, continuous duty, 1/30 H.P. electric motor, rated 12,000
R.P.M. Transformer included for use on 110 VAC current. Also
applicable for 24-32 VDC.

PUMP MFD. BY WELDON TOOL CO. with stand-
ard 1/2" tubing ports; rated 2 G.P.M.; remove
pump and use motor as high speed grinder.

OVERALL DIMENSIONS: 7 3/4" long x 3 3/4" high
x 3 1/4" wide. Approx. wt. 5 lbs. \$51.00 value.

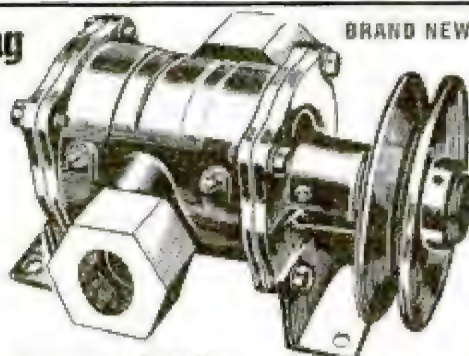


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BRAND NEW

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Perfect for draining basements, irrigation,
fire fighting, sprinkling, pressure booster,
insecticide and other spraying, fuel transfer,
stock watering, industrial pumping, deep well jet pumping and
home water systems. Rated 25 ft. suction and 150 ft. head pressure
at 80 gallons. Use from 1/2 to 5 H.P. motor.

Complete engineering report and
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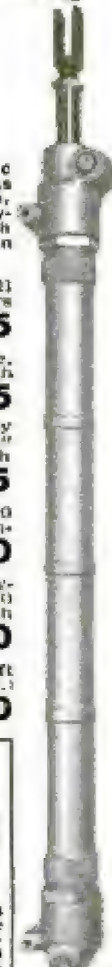
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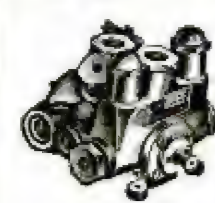
Air or Oil HYDRAULICS

Use hydraulics on arbor presses, hydraulic
presses, hay lifts, manure loaders, lift trucks
—push or pull, tilt or turn, press or squeeze,
open or close, lift or lower—and other hy-
draulic and industrial applications. Use with
either air or oil . . . of finest precision
workmanship.



1. Double action, 1 1/2" bore, 5" stroke, will
lift 1760 lbs. in one second with Vickers
MF9 Pump. Wt. 3 lbs. A \$35.00 value. **\$8.95**
postpaid
2. Double action, 1 1/2" bore, 9" stroke,
will lift 1760 lbs. in one second with
Vickers MF9 Pump. Wt. 4 lbs. A \$45.00 value. **\$10.95**
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3. Two these cylinders on farm trucks, bulldozers, hay
lifts, manure loaders, etc. Double action, 1 1/2"
bore, 27" stroke. Will lift 1760 lbs. in 2 seconds with
Vickers Pump. Wt. 8 lbs. A \$55.00 value. **\$12.95**
hydraulic cylinder value for only. postpaid
4. Double action, 2 3/4" bore, 3" stroke. (Will lift 4400
lbs. in one second with Vickers Pump.) Will with-
stand 1500 P.S.I. against wall. Wt. 7 lbs. A \$65.00 value. **\$14.50**
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5. Double action, 3" bore, 10 1/2" stroke. All steel hy-
draulic cylinder, will lift up to 12,000 lbs. (7000
lbs. in 3 seconds with Vickers Pump.) Complete with
fittings. Wt. 12 lbs. A \$78.00 value. **\$19.50**
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9600 lbs. in 7 seconds using Vickers MF9 Pump.)
Complete with fittings. Wt. 15 lbs. A \$92.00 value. **\$22.50**
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Hydraulic Control Valves Brand New



1. Four-way control valve with
built-in relief valve, for use
with double action hydraulic cylin-
ders, may be used with 1500
P.S.I. hydraulic system to open
and close hydraulic cylinders.
Brand new, Ship. wt. 4 lbs. A \$38.00 value. **\$7.95**
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2. Four-way control valve for use with two hydraulic double action
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other or in conjunction with the other. Oil may be locked in any of
the cylinders to hold the piston at any required position. Brand New,
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3. A two cylinder double action valve with a unique arrangement,
allowing the operator to raise both cylinders simultaneously, to
lower them simultaneously or to raise one and lower the other at
any predetermined rate and speed. Brand New, Ship. wt. 8 lbs. A \$75.00 value. **\$14.95**
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Vickers Heavy Duty HYDRAULIC PUMP



For tractors, bull-dozers, construction ma-
chinery, lift trucks, industrial applica-
tions, etc. Used on Ross carriers. Delivers
18 gals. per minute at 1000 P.S.I. at 1200
R.P.M. using 1/2 H.P. Has 1 1/2" intake;
1 1/2" outlet; threaded and
keyed 3/4" shaft for direct
or pulley drive. Wt. 40 lbs.
Dimensions: 5 3/4" diameter,
7 1/2" high. Original value
\$148.00. NOW **\$39.50**
F.O.B. Chicago

Brand New Vickers Heavy Duty HYDRAULIC CONTROL VALVE

This Vickers heavy duty 4-way control valve, Part C-2330, is ideal
for use with the Vickers Heavy Duty Pump for double action cylinders.
Has built-in relief valve with 50 to 1000 lbs. per sq. in. overload
adjustment; max. capacity 24 GPM; pressure inlet connection from
pump 1/2" pipe thread; cylinder connections 3/4" pipe thread; dis-
charge connection to tank 1 1/2" pipe thread. Over. dimen.:
2 1/2" W. x 10 1/2" L. x 5 3/4" H. Ship. wt. 54 lbs.
ORIGINAL COST MANY TIMES MORE. **\$24.95**
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ALUMINUM TENSION SCREEN A FULL-LENGTH SCREEN FOR DOUBLE-HUNG WINDOWS

What a money-saver this Durall! You're ahead up to dollars per screen on the price alone . . . and you'll never pay for painting or costly repairs.

And what a trouble-saver! Just buy the size you need, install brackets and snap screen into place . . . from inside! It's flexible . . . no side frames to cut and fit, no ladder climbing. Simply release screen at bottom for window washing . . . roll it up for storage.

Beauty? Yes, indeed! Durall is neat, trim—it will not rust, stain, sag or bulge.

See Durall at your dealer's today or send coupon for attractive folder.

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with one of the instruments. Ordinary old-fashioned panning, wet or dry, the same method used for detecting gold, is a useful field method of concentrating a mineral sample from the rock that contains it. Any dark, heavy concentrate that remains is likely to be valuable and might well be tested for a possible uranium content. Ultraviolet lamps whose rays cause numerous minerals to fluoresce in characteristic colors is a valuable aid in detecting some of the secondary uranium minerals.

Recent reports that there is not enough uranium available for a long-term atomic energy program have been branded as false by David E. Lilienthal, chairman of the AEC.

"The present search for uranium and the sources we have our hands upon provide an adequate supply and in the future will be sufficient," says Lilienthal.

Inquiries concerning worthwhile ores should be addressed to the Division of Raw Materials, U. S. Atomic Energy Commission, P.O. Box 30, Ansonia Station, New York 23, N. Y.

Oscillating Sander Has Double Motion



Compound motion of the pad on an oscillating sander speeds work in finishing and rubbing operations. The leading edge of the pad has a circular movement for fast cutting across the grain, while the trailing edge has a reciprocating motion that sands with the grain for a smooth finish. Abrasive sheets, cut to fit the synthetic-rubber sanding pad, come with adhesive on the back to simplify replacement. The rectangular shape of the pad permits the operator to sand right into the corners in recessed door panels or other work. The sander can also be used for sheet-metal work such as automobile-body repair.

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Fits all cars — chrome plated
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NEWEST OTTAWA LOG SAW

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ANYWHERE on OWN POWER

World's fastest Log Saw. Powerful 6 H-P air-cooled motor. Attachments for sawing down trees, buzzing limbs, post hole digging and pulley for belt jobs. Big demand for wood, pulp, posts. Make big money sawing wood this easy way. Low factory-to-user prices. Nothing like it. FREE details.

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ABOUT A
SHIP-IN-A-BOTTLE

Here is the secret plus all
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BEATS
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Safe Boats With
Full Length Spray Rails

Keep passengers perfectly
dry—even at high speeds.
Catalog also shows two new
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Boats. Two big factories—
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Write for your copy. State kind of
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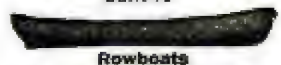
THOMPSON BROS. BOAT MFG. CO. (161)
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CORTLAND, N.Y.



Better Built
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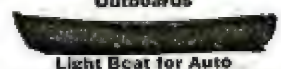
Canoes



Rowboats



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Talk about Versatility..
THIS HANDY DRILL
is in a **CLASS**
by **ITSELF!**



Home-Utility
¼" Drill
\$18.95



Drilling for
Cabinet Work
Sanding
Curves,
Corners, Flats
Grinding Off
Burrs
Sharpening
Tools and
Knives
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Rust and Old
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Drilling Out
Broken Rivets

"I used to think a Drill was only for drilling—but my Home-Utility ¼" Drill has enough power and speed for sanding, light grinding, buffing and wire brushing, too! And for better, faster workshop drilling, it's a world-beater. Just when you think you've exhausted its uses, you'll find new ones for this handy Home-Utility Drill. To top it off, it's built by BLACK & DECKER, the people who've been making quality electric tools for 38 years. That means a powerful motor, husky housings, full-size gears and bearings. At only \$18.95, you won't find a bigger value!" Order Home-Utility Tools from your hardware, electrical or implement dealer.

ELECTRIC
HOME-UTILITY
TOOLS

Products of THE BLACK & DECKER MFG. CO.
Dept. H2M, Towson 4, Maryland

SAY YOU SAW IT IN POPULAR MECHANICS

Save Time and Money
with this Press

Ten-ton press, ideal for all
kinds of pressing, separating,
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jobs. Ample capacity for home
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Roller-bearing ram for long
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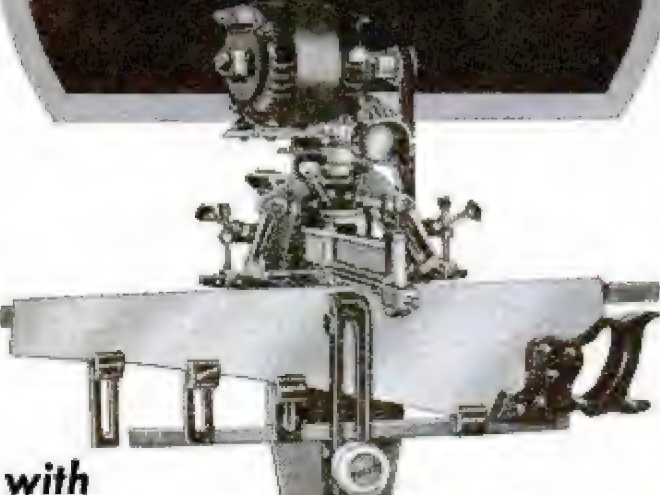
UT-10A Press f.o.b. factory \$31.00

DAKE ENGINE COMPANY

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Made
\$900
IN SPARE TIME



with
FOLEY automatic SAW FILER

*Trade Mark Reg. U. S. Pat. Off.

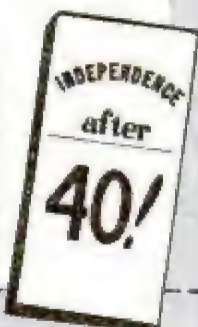
"I did very well last year with my Foley equipment, about 950 saws and 240 lawn mowers, in my spare time. About \$900 for me." L.H.M., New York. A.G.W. in Mass. says: "I have filed over 5000 saws in 8 years and find the Foley Automatic Saw Filer very satisfactory."

Make up to \$2 or \$3 an hour in Spare Time. With the high prices of food, clothing and everything else, just think what you could do with extra money every week! With a Foley Automatic Saw Filer you can file hand, band and circular saws better than the most expert hand filer. "The first saw I sharpened with my Foley Filer came out 100%"—writes C.E.P. Every saw you sharpen with the machine accuracy of the Foley Saw Filer is an ad that brings you more customers. Cash business, no canvassing. No eyestrain, no experience needed.

FREE BOOK

INDEPENDENCE AFTER 40!

Shows just how you can start at home in spare time in your basement or garage. Just think—with a small investment, no overhead, no stock of goods to carry, you can get right into a cash business—and later on develop into a full-time repair shop. Send coupon today for this practical plan.



Send Coupon for FREE BOOK

FOLEY MFG. CO., 216-9 Foley Bldg., Minneapolis 18, Minn.
Send FREE BOOK—"Independence After 40."

Name _____

Address _____



"Cat Whisker" Radio Tube

Nearly all the functions of a vacuum tube are performed by an extremely small and simple tube that requires no vacuum, glass envelope, grid, plate, cathode or warm-up period. The simple tube, developed by Bell Laboratories, is not much larger than a shoelace tip. It operates similarly to a "cat whisker" crystal set, except that the tube will amplify at least 100 times. The tube consists of two hair-thin wires touching a minute quantity of germanium, a rare metal by-product of zinc. Germanium is a semiconductor of electricity. When power is delivered to one contact it is amplified 100 times by the crystal and delivered to the output circuit. The tube may be used in telephone communication as well as radio, television and public-address systems.

Mist Wipes Out Odors By Chemical Reaction

Odors can be eliminated by changing them chemically to an odorless substance with a new deodorant called Metazene, rather than by the usual method of masking them with a more pleasant odor. Metazene mist combines with unsaturated sulphur and nitrogen compounds, which cause many disagreeable odors, and removes them from the air within five seconds. The exact chemical nature of the deodorant has not been announced and it is not yet commercially available.

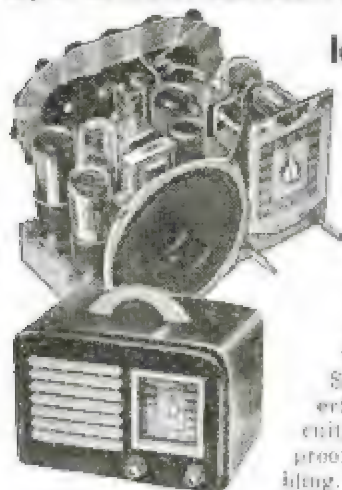
Safety Car-Door Lock

Children can't fall out of a car equipped with door locks which slip into place whenever the motor is running. A vacuum tube from the engine pulls the strikers into locked position as soon as the starter is pushed. The doors remain locked until the driver presses a button on the instrument panel to break the vacuum, or until after the motor is stopped.

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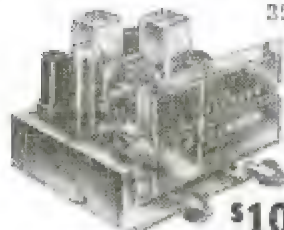
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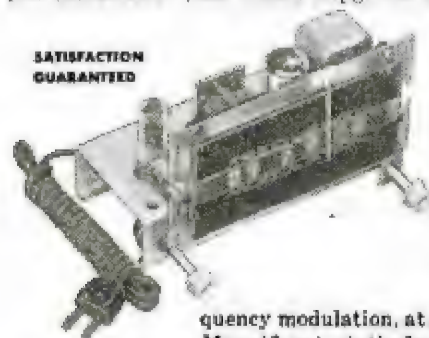
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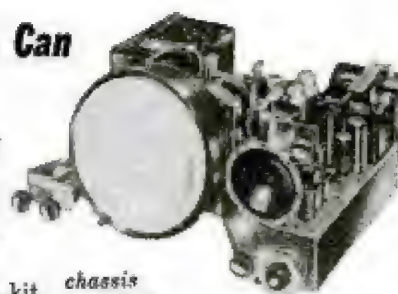
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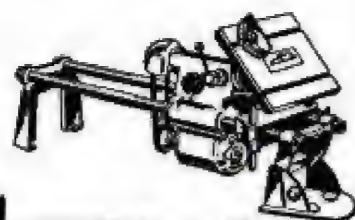
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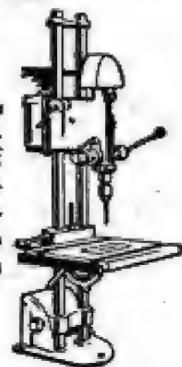
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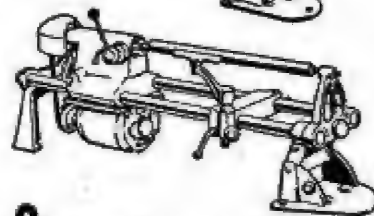
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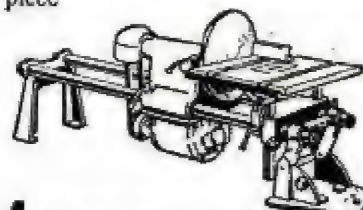
1 **SHOPS MITH** as an 8" Circular Saw. Depth of cut $2\frac{1}{4}$ ". Table $14\frac{1}{2}$ " x 17"—with extension 54" x 17". Up to 46" between blade and fence. Tilting table



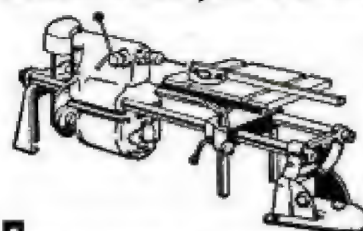
2 **SHOPS MITH** as a Vertical Drill Press. Drills to center of 15-inch circle. 27-inch maximum distance from table to chuck, $\frac{1}{4}$ -inch feed



3 **SHOPS MITH** as a 34" Wood Lathe. (34" between centers) with a 15-inch swing. Quill feed $\frac{1}{4}$ inches. Tool rest always slides parallel to work piece

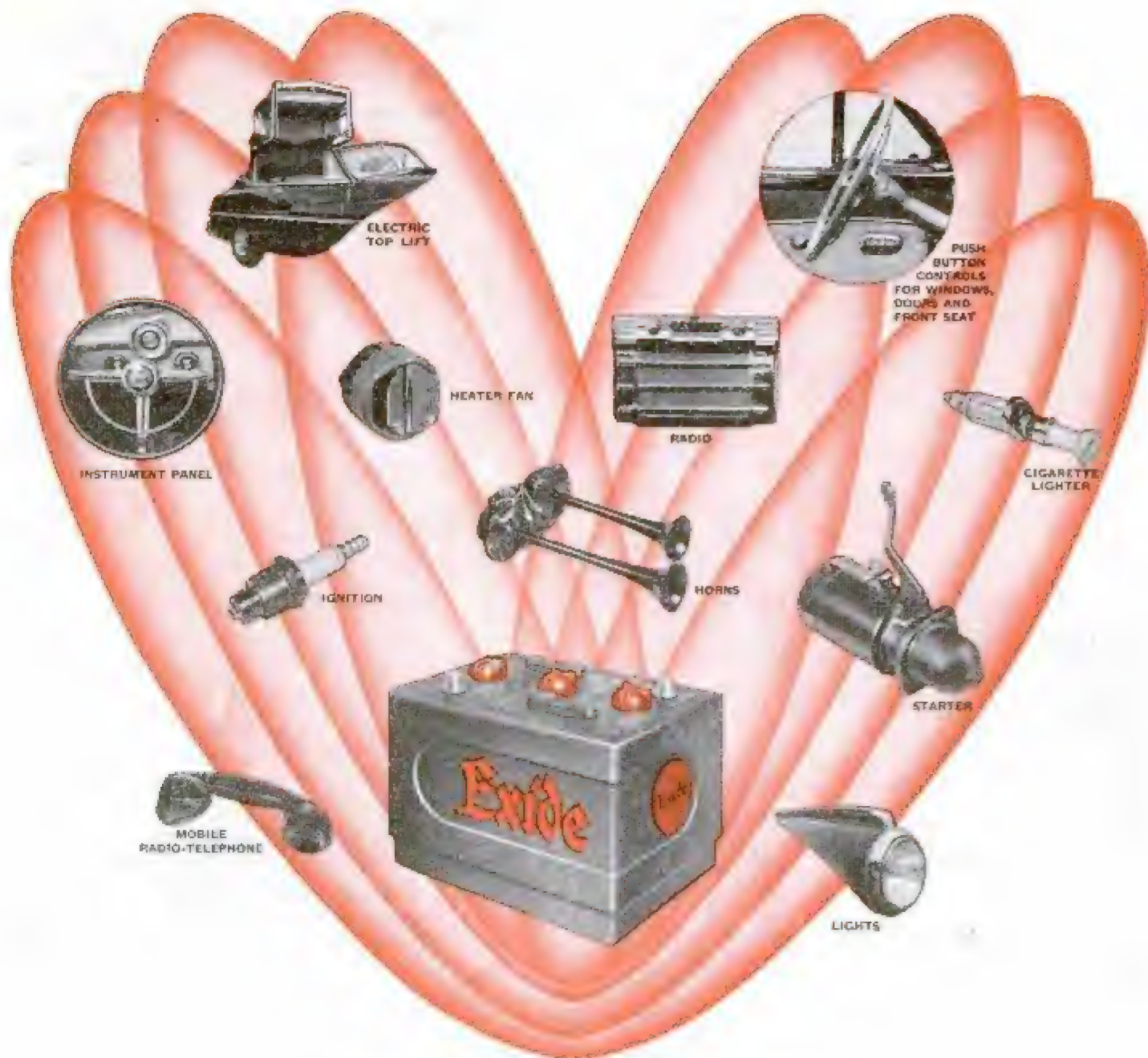


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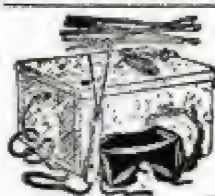
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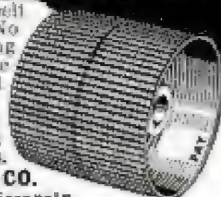
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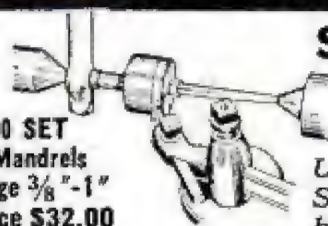
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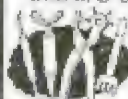
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DEPT. PM-2 • 4707 EUCLID • CLEVELAND 3, OHIO

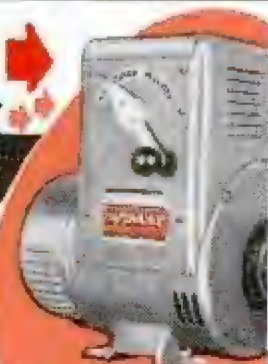
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You can do it inexpensively with only a wrench and a little spare time. Famous Zeolite process as used by leading manufacturers. Send \$1 for easy-to-follow directions and list of materials. (Materials available locally or from us.) Or inquire about factory-built **LARCO Softeners \$45.75 up.** **LAKE REGION MFG. CO., INC., 3920-A Lynn Ave., Minneapolis 16, Minn.**

With this HOBART "Build your own" Combination A.C. Welder and Power Generator

Saves you \$300 to \$500

over cost of factory built machine. This one, that you can build yourself, **ARC WELDS** and **POWERS TOOLS** and **ELECTRIC LIGHTS ANY-PLACE**. Valuable to garages, farmers, contractors and others who want to double their earnings by doing repair and construction work in places where electric power is not available.



Furnished with pulley or shaft for coupling to your own engine

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to earn big money and you can pay for your arc welder as you go. Many large, prosperous welderies of today had their start with a Hobart low cost "Build Your Own" portable arc welder and paid for it out of their profits.

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gasoline engine drive portable arc welder. It's easy with the Hobart generator, a reconditioned auto engine and chassis. Send coupon today for FREE book "How to Build Your Own Portable Arc Welder," no obligation.

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Gas drive welder

Industrial type AC

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SAY YOU SAW IT IN POPULAR MECHANICS

SAVE \$\$\$\$



COMPACT PORTABLE ARMY FIELD TELEPHONES

Buy 2 phones
and SAVE \$1.50

**This SPECIAL offer good only thru
March 31, 1949. ACT NOW!**

Amazingly simple to install and operate. Just hook up terminals of two or more phones to any two-strand wire and you are ready to talk up to 17 MILES! Powered by standard flashlight batteries. **HUNDREDS OF USES** for quick, low-cost, dependable 2-way communication around **HOME, SHOP, FARM, INDUSTRY**. Each phone complete with self-contained hand-operated ringer. Every phone checked for perfect operation and fully guaranteed.

	Buy 1 Phone Regular Price	Buy 2 Phones Save \$1.50
USED —excellent condition.....	\$ 8.95	SPECIAL 2 FOR \$16.40
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NEW. HEAD AND CHEST SETS , ea.....		4.95



ARMY FIELD TELEPHONE WIRE

Weatherproof, Durable. 2-conductor, twisted, 3 copper and 4 steel strands, tinned, insulated. On Original Steel Reels.

W-110B , Unused, new, but stored in open. Half-mile reels (2500 to 2750 feet). Wt. 85 lbs. Each.....	\$14.25
500-foot coil (14 lbs.).....	\$3.50
1000-foot coil (28 lbs.).....	\$6.50

W-130 LIGHTWEIGHT ASSAULT WIRE. Weighs only 16 lbs. New, half-mile reels (2600 feet) each.....

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All prices F.O.B. Sacramento. No C.O.D. California residents add 2 1/2% for sales tax. Small orders sent postage collect plus small handling charge.

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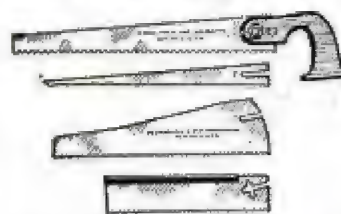
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SAY YOU SAW IT IN POPULAR MECHANICS

LOOK! 3 Terrific Buys!

**Amazing 4-in-1
Saw Nest-only \$1.98**



Consists of varnished beech handle and 4 blades. (a) 16" utility with teeth on both edges, (b) 14" compass, (c) 14" panel, (d) 10" back or mitre blades. Only \$1.98.



MILLERS FALLS AUTOMATIC DRILL
—Set holds 8 drill points in handle, sizes 1/16"-11/64". Turn handle, size wanted comes out! 9-1/8" long, nickel plated. Complete only \$3.39



MILLERS FALLS CARVING TOOL
6 tools for all effects on wood, linoleum. Length 6-1/4". Only \$4.39

Send no Money. Merchandise shipped on approval. Send name, address. Pay on delivery, plus charges. Or enclose check, M.O. or postal note and we pay all charges. Money Back if you can beat these values!

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FOR BIG MEN ONLY!



SHOES IN SIZES 10 to 16

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RICH OPPORTUNITY FOR MEN IN THEIR 50's!



Capable, mature salesmen are now needed for fascinating, profitable outdoor occupation. No investment needed. 150 of our men made \$300 to \$3,000 in one month—many just beginners. Read actual earnings: J. B. Wallace, \$164.95 first 2 hours; D. A. Crowley, \$224.00 first day. Incomes listed are exceptional. Openings available—earnings paid immediately. No collection—we make deliveries. Write today!

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FIN-DER SAX-SLING

NEVER SLIP OR KINK
HIGH SPEED ADJUSTING
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NEW!

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LOOK! DO FACTORY FINISH PAINTING WITH THIS AMAZING, ALL-ALUMINUM, LOW COST PAINT SPRAYING UNIT



**Factory Set—Easy to Operate
FOR PAINT, LACQUER,
STAIN AND WAX
Needs No Cleaning!**



Complete with
AIR COMPRESSOR
6 FT. THICK-WALL HOSE
2-6 OZ. CONTAINERS
WITH JET CAPS
LIFETIME
COLOR-FAST HANDLE
FULL INSTRUCTIONS
WITH UNIT
A Caxco Product

ALL FOR
\$995
POSTPAID

Spray automobile fenders, furniture, woodwork, machinery, etc. 50 lb. pressure obtained with easy foot-operated compressor—needs pumping only at intervals to keep air supply constant. Containers may be refilled as often as required. Disposable spray jets. Perfect for home use or in automotive repair shops, washboiling shops, factories, boat yards, hobby shops, etc. Entire unit weighs only 2 lbs.

THE HOWARD COMPANY
Dept. 12 — 615 Davis St.
Evanston, Illinois

MONEY BACK GUARANTEE

NEW Versatility for Your Shop Projects



NEW POWER KING 12" BAND SAW

HANDLES ALL BAND
SAW JOBS IN
WOOD, PLASTICS,
LIGHT METALS,
COMPOSITIONS

Outstanding Construction for a Lifetime of Service

The properly engineered weight that is a "must" for smooth band sawing is achieved in the Power King with heavy cast iron base, arm, and table. These are balanced and braced to minimize vibration.

Upper and lower saw wheels turn on precision ball bearings and are equipped with replaceable rubber tires to protect the blade and provide positive traction. Upper wheel tilts for correct blade alignment — easily adjusted to maintain proper blade tension.

Four oilite bronze guides keep the blade accurately in work position. In addition, the back of the blade is supported above and below the table by large sealed ball bearings.

You can increase the usefulness of your shop a dozen-fold with the new low-cost Power King 12" Band Saw — turn out "professional" work fast and easy!

A big-capacity tool that cuts up to 6¼" deep, the Power King zips through wood, wallboard, cardboard, plastics, aluminum, and other light metals — cuts clean and true every inch of the way, straight or curved.

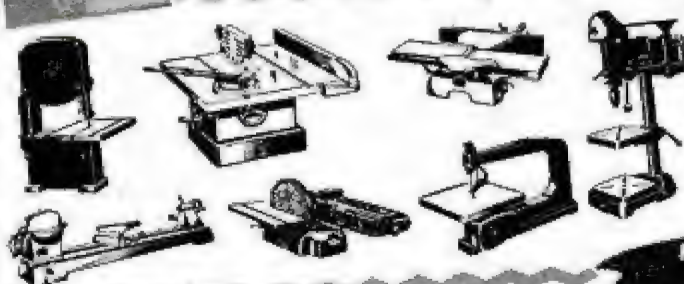
An important feature of this saw is the big cast iron table — 14" x 14". It is precision ground for smooth sliding of stock to blade — tilts 45° for angle sawing. Other design and construction highlights include heavy grey-iron castings for base and arm, ball bearing equipped saw wheels for smooth running and long wear, oilite bronze blade guides.

Your Power King dealer will be glad to demonstrate the Power King 12" Band Saw and show you how it will increase the efficiency of your shop. See him soon — and send for the new complete Power King catalog today.



**NEW! FREE CATALOG SHOWS
ALL 8 POWER KING TOOLS**

Send a Postcard



ATLAS PRESS Company

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**MATCHED PRECISION TOOLS FOR
WOODWORKING AND METALWORKING**

**YOU CAN'T BEAT SWEDISH STEEL
FOR A BETTER CUTTING EDGE**

GENSCO (MADE IN SWEDEN)

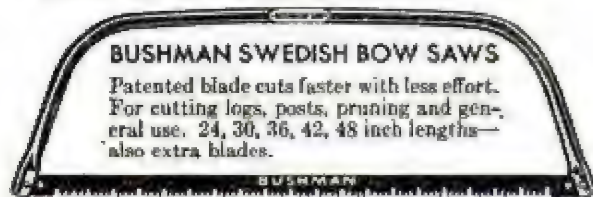


TANGED BUTT CHISELS

The finest steel you can get in a wood chisel—Charcoal Steel blades individually heat treated, tempered and honed. Tough curly birch handles metal reinforced. $\frac{1}{4}$ " to 2" widths.

**SLOYD
CARVING
KNIVES**

Tough Swedish steel blades, hand honed and razor sharp. For working wood, leather, plastic, linoleum, Curly birch handles. Lengths $6\frac{1}{8}$ ", $6\frac{3}{8}$ " and $7\frac{1}{8}$ ".



BUSHMAN SWEDISH BOW SAWS

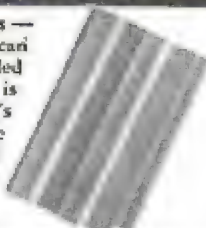
Patented blade cuts faster with less effort. For cutting logs, posts, pruning and general use. 24, 30, 36, 42, 48 inch lengths—also extra blades.

Available at Leading Hardware Stores or write:

GENSCO TOOL DIVISION
General Steel Warehouse Co., Inc.
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World's Finest Roof

You can earn big money in the Duntile business—100% to 150% mark-up on basic costs. You can manufacture for a selective market—uncrowded and minus price-competition—because Duntile is exclusive and much-wanted. Duntile is the world's most beautiful roof. With all the safety, endurance and economy of masonry at its best. Wide range of smart fused-on colors. French or Spanish type. Truly the roof that every owner wants, because the roof is the most noticed part of the house.



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Swing into Duntile production NOW. Tie in with the biggest building cycle in history. High income potentials on low investment. Manufacturing is easy, interesting, profitable. Automatic power equipment enables maximum production at minimum costs. We supply all machinery necessary. Instruct you fully. Back you with aggressive cooperation. Write for descriptive literature and Manufacturing Analysis.



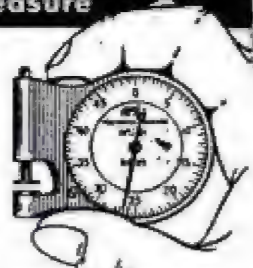
W. E. DUNN MFG. CO.
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DUNTILE

NEW Pocket Thickness Measure

A pocket-watch size precision dial micrometer weighing only $1\frac{1}{2}$ oz. for accurately measuring the thickness of sheets, strips or tubing, round, square, or hexagonal stock, tissues, fibres or filaments of materials such as rubber, metal, paper, plastics, leather, glass, cloth or wood.

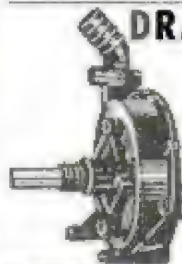
4 MODELS: .0005", .001", and .01 mm graduations. Range of all models $\frac{5}{16}$ " (8mm).



PRICE \$15.10 Postpaid complete with leather case and full instructions.

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WALTHAM 54, MASS.

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**DRAINS CELLARS, WASH TRAYS
CIRCULATES OIL**

Pumps 1800 GPH 300 gal.
30' high, use $\frac{1}{8}$ to $\frac{1}{2}$ HP **\$6.50**
motor. Will not clog.

Postpaid if cash with order.
(Add 50c for west of the Mississippi.)

Thousands in use since 1936

LABAWCO PUMPS, BELLE MEAD 7, N. J.



LAWN ORNAMENT-NOVELTY PATTERNS

28 Lawn Ornament Patterns, 25c. Other patterns; 15-20" high; Dutch Girl, Dutch Boy, Pirate, Bull Terrier, Mexican Girl, Mexican Boy, Dwarf, Penguin, Flower Girl, 10c each. 25 Novelty Patterns, 30c. All 62 Full Size Patterns, \$1.00 Postpaid. Stroller Pattern Service, Dept. AW-8, Box 128, Belington, W. Va.

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NO BELTS • NO CHAINS
POWER TURNING

FLOW, DISC, HAWK, CULTIVATE
AND PLOW SNOW
3-5 H.P.

Easy to Operate • Economical

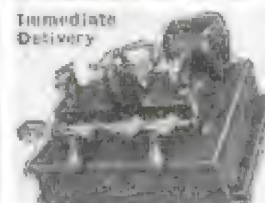
RED-E IS DIRECT DRIVE ALL GEARS ENCLOSED.

BUY DIRECT FROM FACTORY
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MARCOT KEY MACHINE

Immediate Delivery



MARCOT No. 8 KEY MACHINE, mounted on Cabinet, less motor, \$ 95.00
Auto Code Book and Auto Depth Keys 12.50
100 Oa. Popular Cylinder Key 60.00
Blanks
Set — Key File, Follow-Through Rods, Lock Picks, Bit Key Gauge, Thimble, Pins, Springs, 10.50
"Locksmith Trade Books" 6.75
How to Open Locks without Keys or Picks; Secret of Locksmithing; How to Make Keys by the Impression Method; Master Key Systems.

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Send postcard today for FREE catalog of modern saleable projects—kitchen cabinet units, trellises, lawn furniture on wheels, highball server, home bar, electric pencil, children's room furniture, keep-off-grass signs, etc. Craftplans, 7241 Madison, Dept. P-137, Kansas City 5, Mo.

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**We PAY YOU for YOUR
TOY IDEAS
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Nationally known manufacturer of metal toys retailing for 50c or under will buy your ideas or pay you royalties. Our line is sold in chain stores. All ideas will be considered. References furnished.

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Here are Real **WAR SURPLUS BARGAINS!**



CLUTCH



for motor-scooters,
motor-bikes,
lawn mowers, etc.

Mercury centrifugal clutch for use
with any small gas engine. 3"
"A" belt pulley, 5/8" bore. Brand \$995
new only. (Stock #400)

BALL BEARING ARBORS



Grinding and saw arbor, has 1 1/2" double end
shaft, 11 1/2" long with 2" center pulley. New
Departure double roll ball bearings. Right
and left hand thread. Self aligning Dodge
pilot block. 10,000 RPM. Bearings alone
list at \$10. Complete arbor new \$495
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HI-SPEED GRINDER (not pictured). Has 2
step pulley driven thru rear of base. \$1095
(Stock #328).....only

Electric Rubber Cable (ALL NEW)



CORD SETS

Extension cords, 100 ft. heavy
duty. Plug, socket and guard.
Number 10 wire. Worth at
least \$10. \$535
OUR PRICE (Stock #310)

Same as above—50 ft. \$385
length. (Stock #311).....only

HEAVY DUTY ELECTRIC CABLE

3 wire #10 rubber Tyrex cable—with lugs.
65 ft. lengths. \$1300
Stock #365. NEW.

3 wire #10 submarine cable and lugs—can
be placed underwater, underground or over-
head. Also for portable tools. Will carry 40
amps. Stock #312

50 ft.	100 ft.	250 ft.	500 ft.
\$12.00	\$20.00	\$45.00	\$85.00

4 conductor neoprene covered #18 stranded
tinned copper wire (two blacks & two whites).
Run in parallel gives you #10 gauge. Lugs
furnished for parallel run. Water & oil res-
istant. (Stock #346)

100 ft.	250 ft.	500 ft.	1320 ft. reel
\$4.25	\$10.00	\$19.00	\$36.00

150 ft. reets, 3 wire #8 with 4, 60 amp
Crouse & Hines connectors—2 male & 2 fe-
male. Perfect for welders, hay loaders, saws,
electric ranges, etc. List price \$65.00
\$190. per reel. OUR PRICE.....
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FURNACE BOOSTER FAN

8 1/2" ball bearing fan Mfg. by Rob-
bison & Meyers. Can be run ver-
tically or horizontally. 110 volt
AC 60 cycle motor with plug and
cord. New in original box. \$1195
(Stock #401).....only

HALF TON WAGON

"ASSEMBLED OR IN KIT FORM"



Heavy duty
wagon with
plum alumi-
num body
24" x 42"
5/8" steel
axle with
ball bearing
wheels. Heavy rub-
ber tires. Ideal for newspapers, farms, grocers,
parts dept, etc. Approx. wt. 88 lbs. Nothing
like it now on the market.

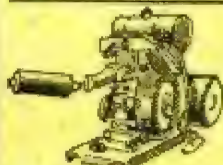
WRITE FOR FREE CIRCULAR. (Stock #332)



U. S. Signal Corps TELEGRAPH KEY

High quality professional type. Cost \$125
Gov't. \$7 per pr. OUR PRICE only, each
\$198

We Pay Postage On This Item (Stock #402)

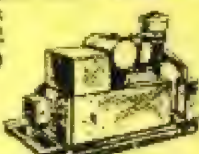


AC ARMY LIGHT PLANTS

New 750 watt 110 volt 60 cy. light plant
with Briggs-Stratton model AP gas engine. (Stock #315).....

New 1000 watt 110 volt
60 cy. light plant with
Briggs-Stratton model BP
gas engine. \$17950
(Stock #316)

New 3500 watt 110
volt 60 cy. light plant
Briggs-Stratton model Z
8 HP gas engine.
Used. \$22500
like new....



(Stock #317)

New..... \$26500
Add \$10 for tools and spare parts.

Rebuilt 5000 watt 110 volt 60 cy. light plant
with automatic remote control. Powered by
Jeep 4 cyl. gas engine. Rebuilt like \$62500
new and guaranteed. (Stock #318)

7,500 watt, 110 volt AC light plant powered
by V-8 4 Waukesha 4 cyl gas engine. Conti-
nental or Mullinsworth generator. Remote
control starting with 100 ft. starting cable,
and 100 ft. of 3 wire #8 cable. Complete
switch board. Used. Like new and \$67500
guaranteed. (Stock #347).....

Add \$65.00 for transformer to make plant 3
phase 220 volt.

10,000 watt 110 and 220 volt 60 cy. light
plant with automatic remote control. Pow-
ered by Jeep 4 cyl. gas engine. Rebuilt
like new and guaranteed. \$90000
(Stock #319)

PORTABLE DC LIGHT PLANT

3000 watt 110 volt DC powered by new 6
HP Briggs-Stratton model ZEP gas engine.
Rebuilt generator. Generator alone lists at
\$244.00. Has volt meter, rheostat, 4 female
plugs, and ball bearing 2.75 x 10 rubber
wheels. Guaranteed. \$18500
(Stock #320).....only

GENERATORS

DC-3000 watt, 110 volt. Has voltmeter,
rheostat & 4 female plugs. Lists at \$7500
\$244.00. (Stock #321). OUR PRICE

AC-750 watt 110 volt 60
cycle with voltmeter,
rheostat, 3/4" shaft. Di-
mensions: 9" H x 12" W x
13" L. Wt. 52 lbs. Shield-
ed to prevent radio inter-
ference. Mfg. by Elcor.
\$125.00 value. \$5950
OUR PRICE, new
(Stock #322)

AC 1000 watt — \$6950
(Stock #403).....

DC-3000 watt, 12 volt, 2000 RPM. Heavy
duty, with current cut-out relay, high and
low switch, 30 amp. meter. Can be bought
less shaft and base to be used direct mount-
ed to Briggs-Stratton 1 HP engine. \$700
NEW (Stock #323).....

Complete with base, shaft and bear-
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HORNS and HOWLERS



Motor driven (not a vi-
brator). Heavy duty with
great power and long
life. Adjustable for high,
medium or low tone.
110 volt AC current.
Weather proof. For alarm
or signal horn on boats,
school yards, factories,
etc. List price \$47.00.
OUR PRICE, \$945
new.....

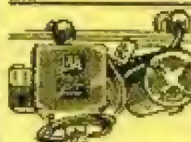
Stock #302



Portable BUZ SAW

Powered by 6 1/2 HP
Briggs & Stratton air
cooled gas engine. Ad-
justable hinge, requires
no clutch. 28" blade,
will take up to 12" hard-
wood. 13 1/2" ball bearing
mandrel. Has power take-
off. Complete unit mount-
ed on two wheels with 400 x 8 pneumatic
tires. Has tow bar for trailing. Wt. approx.
400 lbs. Sold complete or less blade, engine
or wheels. Make \$25 to \$50 a day sawing
wood with this sturdy unit.

WRITE FOR FREE CIRCULAR. (Stock #350)



Electro-Lift HOIST

500 lb. Electro-Lift
hoist. 17 ft. of cable—
up and down button and
trolley. 3 phase. 220
or 440 volt, 60
cycle. Used. In A-1
shape. List price \$185.00. OUR \$9000
PRICE.....
Stock #301 Specify 220 or 440 volt



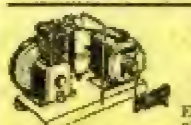
Automatic AIR COMPRESSOR

Complete. Piston type
with 10 gal. tank, 1/2 HP
capacitor type. AC, 110-
220 volt 60 cycle mo-
tor. Will develop 75 lb. pres-
sure—approx. 2 cu. ft. Brand new. \$7950
(Stock #340).....only

Assemble yourself and save \$10.

ABOVE tank with legs \$1195
and saddle.....

AS ABOVE—1/2 HP motor, 2 cyl. Westing-
house compressor. \$10950
3 CFM at 75 lbs.....



Portable AIR COMPRESSOR

Electric motor driven, por-
table, spray painting unit
for jobs requiring a larger quantity of mate-
rial. Piston type, single cyl. air compressor
has 2" bore by 1 1/2" stroke. 2.86 CFM.
Max. Working pressure 40 lbs. Mounted on
base. Equipped with safety valve & drain
cock. 1/2 HP capacitor type motor. 110 volt
AC, with cord and plug. 20 ft. air hose and
fittings. Ship. wt. 45 lbs. Brand \$4250
new. (Stock #348).....only

Westinghouse

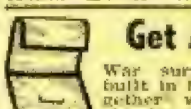
AIR COMPRESSOR

Brand new piston type, 2
cyl. compressor with auto-
matic clutch. Westinghouse
model T-1. Can be run off
power take-off or 1/2 HP mo-
tor. Delivers oil free air. Suggest-
ed operating pressure, 75 P.S.I.
Approx. displacement 3.27 CFM
at 600 RPM. Ideal for spraying,
industrial work, tire inflation,
painting, etc. Approx. wt. 28
lbs. (Stock #345).....only \$2250



KELLOG AIR COMPRESSOR

Kellogg Model 241 air compressor.
Piston type with 2" x 1 1/2" bore.
Capacity of 2.8 CFM at 100 lbs.
V-belt drive. 3/4" shaft. Can be
run with 1/2 or 1/4 HP motor.
Delivers oil free air. Max. recommended
working pressure 150 lbs.
(Stock #349). NEW.....only \$1495



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War surplus tobacco pouch with
built in humidifier. \$1.25 value to-
gether with our free illustrated
circular for only.....20c
COINS or STAMPS ACCEPTED—
WE PAY POSTAGE ON THIS ITEM

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All prices F.O.B. Milwaukee. 25% de-
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C.O.D.'s under \$10.00. Use stock num-
ber when ordering. Many other bar-
gain items not listed—write for our
free circulars.



Here's your future

- ★ \$35 TO \$50 A DAY
- ★ STEADY WORK ★ LIFETIME SECURITY ★ PLEASANT INDOOR WORK ★ SMALL INVESTMENT
- ★ NO SPECIAL SCHOOLING
- ★ NO TIME CLOCK TO PUNCH
- ★ YOU ARE BOSS!

with American

This wonderful future can be yours—as a floor surfacing contractor with an American Machine! We have the “formula” that has brought success to thousands—it can do the same for YOU. Floor sanding is a down-to-earth service that’s needed every day. No big overhead...no large investment (a new car costs 3 times as much). Easy to operate an American Sander. Plenty of prospects—new or old homes—a year ‘round opportunity to make BIG MONEY and be your own boss! Send for “money-making” booklet entitled “Opportunities in Floor Surfacing”—use coupon and enclose 25c in coin or stamps to cover handling.



AMERICAN

FLOOR MACHINES

The American Floor Surfacing Machine Co.
535 So. St. Clair St., Toledo 3, Ohio

Enclosed find 25c in stamps or coin for booklet “Opportunities in Floor Surfacing,” telling me how I can start my own floor sanding business.

Name
Street
City State



The Power Line Comes to Yellowknife

(Continued from page 136)

Of the enormous volume of freight brought in from Canada's “Deep South,” 1200 tons were hauled by steamer and barges for 700 miles from the railhead at Waterways, along a chain of streams and lakes with many portages around rapids and falls. In summer, steamers carried the equipment across Great Slave Lake, larger than Lake Erie or Lake Ontario. Urgently needed materials were flown in from Hay River, a Great Slave Lake port, or from Edmonton, 100 miles away.

In winter more than 226 tons of the heavier equipment were hauled by tractor-trains over the ice-covered lake and then by trails to the power site. Heavy tractors pulled 28 huge sleds and a caboose, used as a dining room and kitchen. These long trains, averaging about 50 miles a day, hauled 125 tons a trip. The crew consisted of two drivers, two brakemen and a cook.

The winter hauling season, limited to about 100 days, begins as soon as the lake ice is sufficiently thick, about the middle of January. Rough ice is a constant problem. An airplane, scouting ahead, spots dangerous fissures in the ice and signals areas of clear passage to the crew.

Even though the extremely cold weather provides a heavy ice layer, there were times when tractors broke through the ice. In every case, however, the equipment was recovered, and no lives were lost.

The 91-mile power line from Snare River to Yellowknife travels across very rocky country, spotted with many lakes of varying sizes. Almost 10 miles of the 91-mile distance is over water. Digging postholes was a Herculean chore since all but 1½ percent of the holes were cut in rock.

The line crews wore parkas made of caribou skins, warm caps, heavy mitts and felt boots. Mechanical equipment took a terrific beating from the combination of sub-zero weather and rugged terrain.

As far north as it is, the Snare River development may soon be considered in the “South” as the industrialization of Canada's Northwest continues. Canadian engineers are planning to push 200 miles north to Great Bear Lake where there are rich deposits of uranium ore.

But today the Snare River project marks the industrial “frontier” of the Northwest. With its power, the residents of Yellowknife can laugh at the sub-zero weather as they live in their modern homes, enjoying the comforts and luxuries of abundant electric lighting and heating.

DELTA MILWAUKEE

Delta-Milwaukee 14" Band Saws can be found in shops of all kinds — wherever accurate cutting must be done easily and economically.



Hobbyists who want the best in power tools equip with a Delta-Milwaukee 14" Band Saw.

\$11585*

without motor
or switch

Double table-supports help you get greater accuracy—even on big, heavy work... with a DELTA-MILWAUKEE® 14" Wood-cutting Band Saw

Cuts wood, felt, corrugated board, paper, other materials

Two trunnions — widely spaced — one on either side of the blade — support the table of the Delta-Milwaukee 14" Band Saw. This gives you a steadier surface to work on. The table stays rigid, at any angle. You're able to saw more accurately.

That's only one reason why this Delta-Milwaukee machine is first choice of those who know fine tools. There are many other quality construction features:

- Ball bearings are used, giving trouble-free performance — and they are lubricated for life.
- The table is big — 14" x 14". It has a $\frac{3}{8}$ " x $\frac{3}{4}$ " miter-gage groove. Tilts 45° right and 10° left.
- Blade guide controls can be adjusted safely at the front of the table.
- Aluminum wheels are carefully balanced, so that the blade is true-running.
- Upper and lower wheels are completely guarded, to protect you. Guard covers saw blade at rear; sliding guard covers all but working surface of blade in front.
- Rip gage is available for ripping.

Have your nearby Delta distributor tell you more about these features for safety, accuracy, economy, and convenience. Inspect the Delta-Milwaukee 14" Band Saw there now — and see his complete Delta-Milwaukee line.

Look for the name of your Delta distributor under "Tools" in the classified section of your telephone directory.



TEAR OUT COUPON AND MAIL TODAY!



DELTA MANUFACTURING DIVISION
Rockwell Manufacturing Company
6808 E. Vienna Ave., Milwaukee 1, Wis.

Send me free copy of Delta-Milwaukee Catalog B-48.

Name.....

Title.....

Company.....

Address.....

City..... (....) State.....

HM-65

\$23575*

without motor
or switch rod

**Two machines mounted together — to save space, time, and money
DELTA-MILWAUKEE
SAW-JOINTER COMBINATION**

Circular saw and jointer mounted on one steel stand and driven by same motor. Both may be operated singly or together. 10" circular saw cuts $3\frac{1}{4}$ " stock. Rips to center of 60" panel. Jointer surfaces boards 6" wide; cuts rabbets $\frac{3}{8}$ " deep. Both tools have lubricated-for-life ball bearings. See this dual-purpose machine at your Delta distributor.

*Prices subject to change without notice

Send for
free
catalog!



Simple attachment increases capacity from 6" under the guide to 12". Can be added any time.



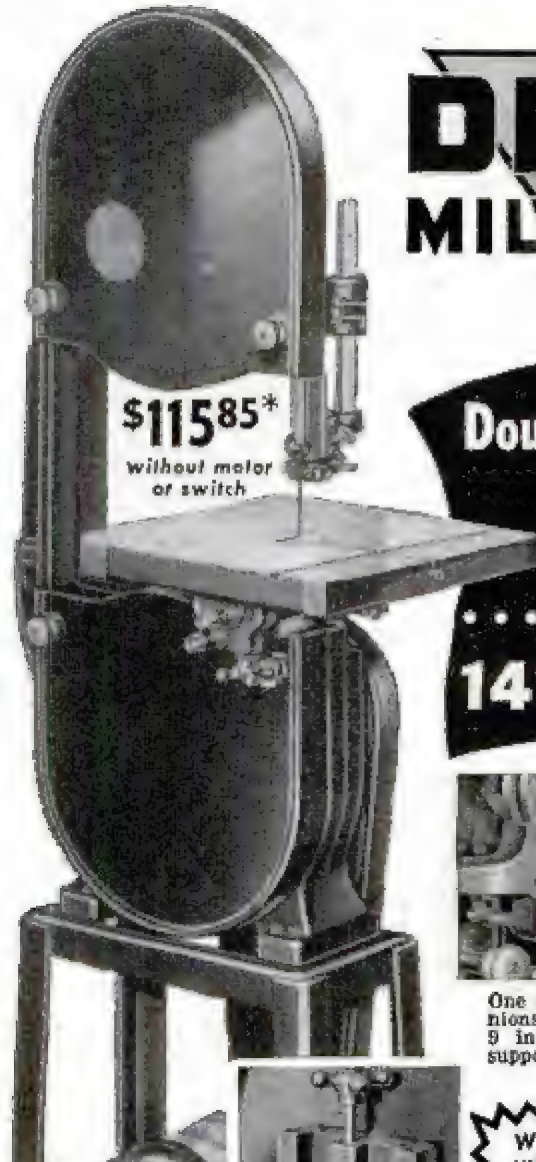
Upper wheel has blade-tension adjustment. Index shows correct tension for various widths of blades.

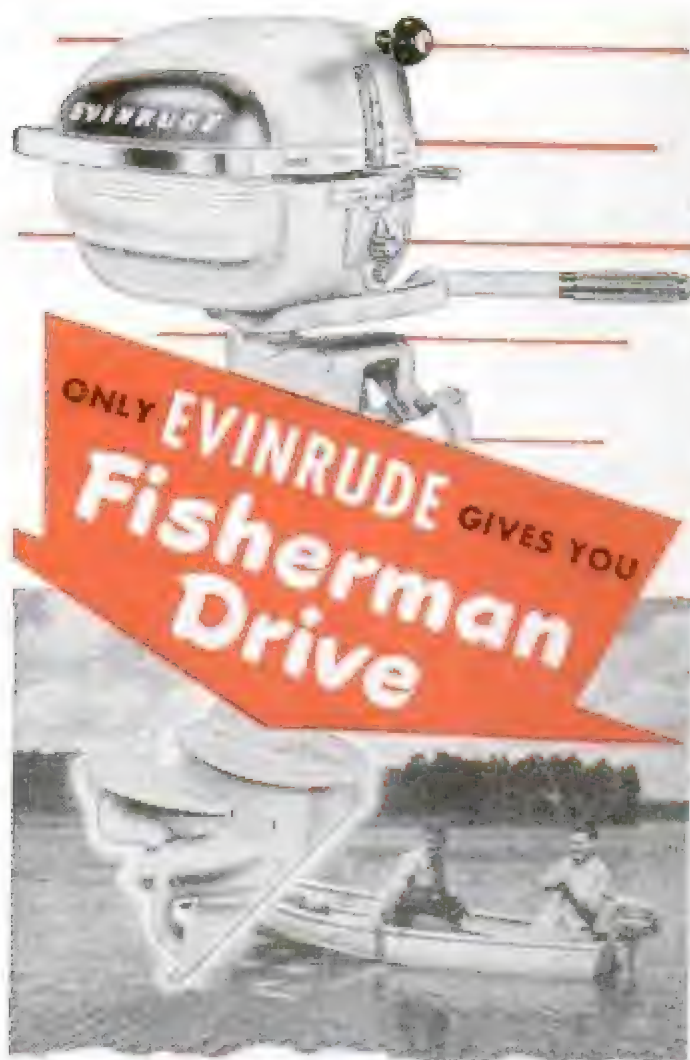


One of the 2 trunnions that are spaced 9 inches apart to support table.

Widely used wherever folks insist upon highest-quality tools:

Cabinet Shops
Carpenter Shops
Display Shops
Furniture Factories
Home Workshops
Hotels
Pattern Shops
Sign Shops
Theatres
Upholsterers
— and other places!





FOR *better fishing* EVERY TRIP!

Why *better fishing*? Because an Evinrude with FISHERMAN DRIVE takes you where the *biggest* fish love to hide! You power confidently through waters you'd never tackle with another motor! Over murderous stretches of snags, stumps, shoals... your motor "bobs" unharmed over obstacles, keeps right on driving! Straight through reeds, rushes, lily pads... your FISHERMAN DRIVE "eels" magically along... speeding you to the best fishing spots... taking you "anywhere there's water to float your boat."

For '49 this revolutionary Drive is yours on three favorite fishing motors, including the famed four-cylinder Zephyr. See your Evinrude Dealer... look for his name in the yellow pages of your phone directory under "Outboard Motors."



SEND FOR FREE CATALOG on the complete line of 40th Anniversary Evinrudes... the right motor for every boat... 1.5 to 50 certified horsepower. Address EVINRUDE MOTORS, 4224 N. 27th Street, Milwaukee 9, Wisconsin.

In Canada, Evinrude Motors, Peterboro, Ontario.

EVINRUDE

FIRST IN OUTBOARDS • 40th YEAR

Life Line to Berlin

(Continued from page 121)

times that long for the same procedure.

Many stories are told at Tempelhof in praise of GCA. One night, pilots relate, the all-seeing radar miraculously guided them to perfect landings through fog so thick they couldn't find their way to the unloading line. Jeeps had to be sent out to lead them in.

Despite the constant demand for high tonnage, safety remains a major Task Force requirement. Lives are not needlessly risked. Flying around the clock, in all kinds of weather, the lift maintains an accident record better than the Air Force's composite world mark. There were seven fatal accidents in the first 96,640 flights.

The lift's most dramatic accomplishments are in the sky, but it is far from a completely air operation. The important jobs of securing supplies and moving them to and from planes are just as efficiently done by the Army's Quartermaster and Transportation Corps. Supplementing the general commodity breakdown of 69 percent fuel and 26 percent food, there is cargo as varied as fire engines, snowplows, bulldozers and heavy rolls of newsprint.

Ground time is as precious as air time to the clock-conscious people who run Operation Vittles. They know they have to squeeze out the utmost in loading and unloading performance during good flying periods. Streaming back and forth between planes at Tempelhof, for example, are 75 ten-ton and "six by six" trucks. Assigned to each are 12 to 14 German laborers, a driver and a soldier from the Army's Constabulary force, who acts as both checker and guard for the load.

As each plane taxis to the unloading line a truck assigned to handle its entire load moves toward the aircraft. Handling time varies with the character of the cargo. Items like flour and coal, in uniform-size sacks, move fastest. At Fassberg 180 sacks of coal were put aboard in seven minutes.

Average time, however, runs about 35 to 40 minutes on the ground at loading and approximately a half hour for the turnaround at Berlin. Ramp expeditors in jeeps maintain a constant patrol to push along any operation that lags. Two Air Force men are inside the plane during loading, supervising the placement of cargo and tying it down securely with steel cable, ropes and rods. Most of the weight has to be kept well forward in the fuselage, just behind the crew compartment.

A technique known as "marrying" insures a safe balance of the 10 tons of weight

(Continued to page 288)



OWN A FAMOUS MOTO-TOOL

The "Pocket-Size
Machine Shop"

HIGH-SPEED STEEL CUTTERS — AT NO EXTRA COST

No modern home workshop is completely equipped without MOTO-TOOL . . . the correctly balanced motor-in-hand tool. It grinds, drills, routs, curves, polishes . . . without vibration. Higher speed does work better, faster, on practically any material. MOTO-TOOL Kit No. 2 includes high-speed-steel cutters for longer life, better work. MOTO-TOOL is backed by over 12 years of industrial use . . . packs years of pleasure. Due to wide popularity and increased production, Dremel's pre-war prices still prevail!

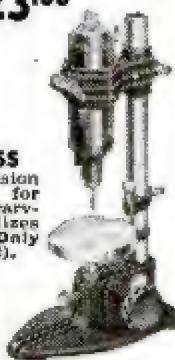


MOTO-TOOL KIT No. 2
With 23 Accessories
(High-Speed Steel
Cutters, Grinding
Wheels, Polishing
Accessories)

\$23.50

NEW DRILL PRESS

This 12" high precision drill press is ideal for model making, wood carving, routing, etc. Utilizes No. 2 Moto-Tool. Only \$9.95 (Less Moto-Tool).



Look For These Moto-Tool Features

Approximately 27,000 R.P.M. plus dynamically balanced armature provides vibrationless finger-tip control. Moto-Tool has oilless, sealed bearings. Patented automatic chuck lock pin. Over-size armature shaft—hardened, ground, polished. 110 Volt, AC-DC motor. Sliding snap-type switch. Cord protector. Shockproof bakelite housing. Dust-filtered air-cooling system. Weighs only 13 oz.

MONEY-BACK GUARANTEE: Buy Dremel Moto-Tools from your dealer. If he cannot supply, order direct on 5-day trial, money-back guarantee. Shipped postpaid for payment in full (Send check or money order); or, send only \$2 now and pay postman balance plus postage upon delivery. Catalog of Dremel Tools and Accessories FREE.

DREMEL MFG. CO. • Dept. T119-B • Racine, Wis.

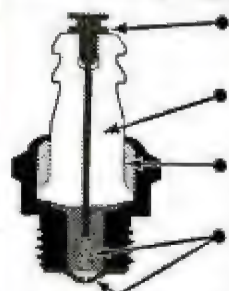
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FOR HEATING AND COOKING STOVES—FURNACES
HEAT YOUR HOME, COOK YOUR MEALS
WITH CHEAP FURNACE OIL

NO MORE SHOVELING COAL OR ASHES. Sensational Fuelizer Starter Vaporizing System turns Cheap No. 1 Furnace Oil, also Kango, Heater, Tractor Distillate, Kerosene and like oils into oil heat—one of the quickest, hottest fires known. **LIFETIME GUARANTEE. \$1.00 Bonus Offer for Testing.** We will let you try it in your own stove or furnace for one month. Get yours for introducing. Big profits QUICK. Be first. Send in your name today for details and cash in on the tremendous demand for this Amazing Invention.

NORTHWEST MFG. CO., 634-B, Mitchell, S. Dak.

Announcing CHAMPION V-Glow Plugs



- CHAMPION TERMINAL**—assures better center electrode seal and provides sturdier electrical connection.
- CHAMPION-CERAMIC INSULATORS**—proved dependable in millions of Champion Spark Plugs.
- CHAMPION SILLMENT SEAL**—prevents excessive compression leakage between insulator and shell.
- CHAMPION "THERM-O-FLEX" CONSTRUCTION**—longer element life, more dependable performance.

Follow recommendations of plug types and fuels approved by engine manufacturer.

CHAMPION

SPARK PLUG COMPANY, TOLEDO 1, OHIO



AMAZING Patented MOTO-SANDER AND POLISHER

Saves Time — Saves "Elbow Grease"

Here's a machine that takes the hard work out of two tough jobs . . . sanding and polishing. "Moto-Sander" is so easy to handle that a child can use it . . . so fool proof that, with it, even a novice can do a craftsmanlike job. Moto-Sander's fast, straight-line action (non-rotary) eliminates any possibility of wood burns or scratches. Does a magically smooth job of sanding . . . gets into corners and places others can't reach. All you do is guide it! There are dozens of time and money-saving uses in every home and shop for this inexpensive machine. Use Moto-Sander to get smooth sanded finish on furniture, painted walls, boats, bird houses, scale models, etc. Use it also for speedy, effortless polishing of waxed furniture, automobiles and other surfaces—simply by removing sandpaper and clamping on polishing pad. Moto-Sander is the lightest, most practical electric sander on the market—the only one of its kind. Furnished with 6 assorted sheets. Garnet paper for sanding . . . plus felt pad and sheepskin for wax polishing. Operates on alternating current. Thousands of satisfied users.

USE MOTO-SANDER AROUND THE HOUSE

- Sand Furniture and Bookcases
- Sand Stairways, Doors, Woodwork
- Sand Walls before painting
- Polish the Family Car
- Polish Planes and Cedar Chests
- Polish Waxed Furniture

MONEY-BACK GUARANTEE: Buy Moto-Sander from your dealer. If he cannot supply, you send only \$14.85 (check or money order) and we will ship postpaid; or, send only \$2 now, and pay postman balance plus postage upon delivery. Your MONEY-BACK if not delighted after 5 days' trial.

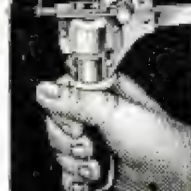
DREMEL MANUFACTURING CO.
DEPT. SP-119-B • RACINE, WIS.

SAY YOU SAW IT IN POPULAR MECHANICS



SAFE AS A HAND SAW JUST GUIDE IT!

The versatile Moto-Saw is as safe as a hand saw. A touch of the trigger switch sets it going . . . releasing stops it instantly.



SAWS TO CENTER OF 19" WIDTHS

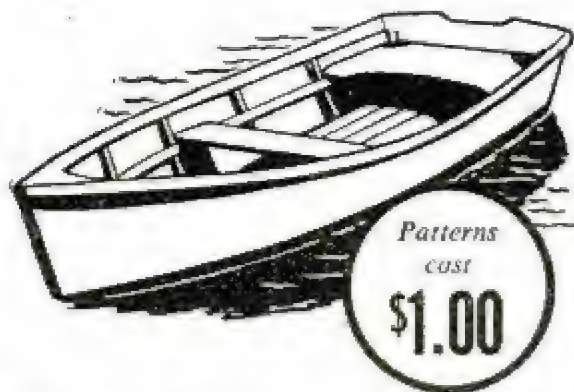
No Limit to Length of Stock it Will Cut
THOUSANDS OF SATISFIED USERS

AVERAGE CUTTING SPEED ONE FOOT PER MINUTE

Moto-Saw works more like magic than any tool you ever saw! Takes no effort to run . . . no perceptible pressure to feed . . . only a trifle heavier than a hand scroll saw, and better balanced in your hand. Runs 7,200 strokes a minute . . . leaves no rough edges . . . easily cuts intricate scroll designs in medium hard wood up to 3/4" thick. Blade holder faces blade 4 ways . . . permits sawing sideways as well as forward and backward. Sturdily constructed . . . only two moving parts . . . never needs oiling . . . requires no bench room or floor space. Operates on alternating current. Thousands of satisfied users.

MONEY-BACK GUARANTEE: Buy Moto-Saw from your dealer. If he cannot supply you, send only \$5.85 for Moto-Saw and 3 blades, postpaid; or, send only \$1.00 now, and pay postman balance plus postage upon delivery. MONEY-BACK if not delighted after 5 days' trial.

DREMEL MFG. CO. • Dept. S119-B • Racine, Wis.



BUILD YOUR OWN BOAT

with EASI-BILD* Pattern Method!

Easy... Inexpensive... Better! You can build this 11½-foot boat yourself—without special tools or skill. Just trace pattern on wood; saw, and assemble. Step-by-step directions plus assembly illustrations make the job simple and foolproof. And with CASCOPHEN, CASCO's new completely durable, water-proof glue, you're assured of a permanent job which will give you many years of trouble-free fun.

Send for Utility Boat Pattern and colorful 32-page Pattern Book. Mail the coupon today.

*Reg. U.S. Pat. Off. by Easi-Bild Pattern Co.

How to choose a glue!

These directions will solve your gluing problems:



For boats, outdoor furniture, sports equipment—joints that must withstand outdoor exposure—**CASCOPHEN** (Resorcin Resin Glue). The first completely durable glue available to home-craftsmen.



For furniture, toys, heavy-duty home repairs—strong, stainfree, moldproof, highly water-resistant **CASCAMITE** (Urea Resin Glue). Mixes quickly with cold water!



For models, photo prints, labeling—general home, school, or office gluing, use the new clean, white, fast-setting **CASCOREZ** (Polyvinyl Resin Glue). Liquid, ready to use!

SEND COUPON FOR BOAT PATTERNS TO:

Casco Pattern Dept. PM-29
P. O. Box 215, Pleasantville, N. Y.
Enclosed is \$..... for patterns checked below.
() Utility Boat, Pattern No. 85—\$1.00
() 32-page Pattern Book, illustrating 94 pattern projects—20¢

Name _____

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THE BORDEN CO. • CHEMICAL DIVISION
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and bulk in each air load. Heavy items, like 230-pound drums of carbides, are mixed in with shipments of cigarettes or medical supplies. Objects too awkwardly shaped for even the C-82 "Boxcars" that handle most such shipments are either dismantled or cut in sections by blowtorches, to be welded together at the destination.

Most of the blockaded city's coal is moved in from Fassberg, in 110-pound sacks, while Rhein-Main and Wiesbaden specialize in foodstuffs and miscellaneous loads. Displaced Europeans are included in trips out of Berlin and as many as 700 children a week have been flown to parts of Germany where food and heating are less critical problems. Goods made in Berlin, a prewar manufacturing center, are loaded in air-lift planes and carried out for distribution to the rest of the country.

No time limit has been set for Operation Vittles' existence. Presumably it will go on until surface access to Berlin is restored. Additional planes are expected to boost the average daily input to about 8000 tons, which is 100 times more than that first day's total.

Mothered by necessity and vastly improved by experience, the aerial arch to the German capital has made the entire world acutely aware of the possibilities of mass movement of goods by air. It has pointed the way to better and faster cargo handling, streamlined maintenance that keeps planes working in the air more hours, improved instrument-flying techniques and necessitated stricter air-traffic control discipline. Lessons that normally take years had to be learned in weeks and months.

It is making all men accept the slogan of General Tunner and his British and American flyers: "We can fly anything, any time, anywhere!"

In addition to the all-important purpose of keeping Berliners alive, the lift has vastly increased respect for the Allies throughout Western Europe, as well as in Russia.

Chemical Added to Hay and Grain Prevents Spontaneous Combustion

Hay and grains are protected from fire due to spontaneous combustion by treatment with a chemical compound that neutralizes the toxins set up by mold and bacteria action. The compound prevents dangerous heat from occurring by shutting off the supply of oxygen. An attachment for any commercial baler meters the compound into the bales in the proper quantities at a cost of less than 50 cents a ton.

Every ITEM
WILL SAVE
YOU Money



RADIO KITS FOR TRAINING AND PLEASURE

HEATHKIT VACUUM TUBE VOLTMETER KIT

Complete kit to build precision electronic volt-ohmmeter. Measures AC or DC voltages with 6 ranges between 3 Volts and 1,000 Volts. Ohmmeter measures 1/10 ohm to 1 billion ohms. Burn-out proof meter — balanced circuit — everything supplied with detailed instructions. Shipping weight 8 pounds.



\$24.50

G.E. ARMY TRANSMITTER-RECEIVER



No. 201. Beautiful 15 tube transmitter-receiver. Operates in new citizens band 460-470 Mc. Supplied new in original G.E. sealed cartons with 15

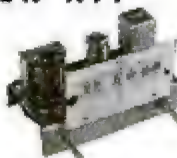
tubes (tubes worth over \$40.00) and conversion instructions to operate between home and car, boat, office, etc. Only a limited number available. Order early. Shipping weight 25 lbs. each. **\$19.50 2 for \$35.00**

ACCESSORIES FOR BC-645

PE-101C. Dynamotor for car use, **\$3.95**
110V. 60 cycle power supply for home or office use. **\$14.50**

HEATHKIT FM TUNER KIT

Complete kit to assemble frequency modulation tuner. Connects to any radio to receive the new static free FM band. Easily assembled — no coils to wind, clear detailed instructions anyone can read — comes complete with tubes and all other parts — slide rule calibrated dial, 110V. 60 cycle transformer operated, etc. Shipping weight 6 pounds.



\$14.75

Mahogany Cabinet (extra) **\$3.75**

HEATHKIT 3 TUBE ALL WAVE RADIO KIT

No. K-1. Enjoy the thrill of building your own set which receives broadcast, police, aircraft, amateur, marine and foreign stations. Simple easy instructions make assembly fun. Every part included — coils for 550 to 6000 Kc. tubes, 110 Volt power transformer, ready punched chassis, calibrated dial. Has power output tube operates loudspeaker (not included). Ideal start in radio. Shipping weight 3 lbs.



\$8.75

Loudspeaker 2 1/2" PM (extra) **1.95**
Headphones **\$1.00**

THE NEW 1949 HEATHKIT 5" KIT OSCILLOSCOPE



No. 03. Complete kit to build a beautiful 5" oscilloscope. Ideal for studying and servicing television and FM radio. 6 tubes including 5BP1 cathode ray tube. 1500 Volt power supply operates from 110V 60 cycle A.C. Has compensated vertical and horizontal amplifiers and 15 cy to 30 KC sweep generator. Detailed instructions make assembly easy. Nothing else to buy. Shipping weight 35 pounds.

\$39.50

METER SPECIAL

No. 237. Beautiful Dejur 3" Square Precision Milli-ammeter 0—800 MA range. 0—10 MA basic movement. Probably the best buy ever offered in a war surplus meter Shipping weight 1 lb.



\$2.95

MINIATURE ELECTRIC MOTOR



No. 211. Tiny Delco motor only 1" x 1/4" x 2" 10,000 RPM. Operates from 6 to 24V Excellent for models. Shipping Wt., 1 pound.

\$2.95

HOME WORKSHOP GRINDER KIT

No. 230. Easily assembled 110V. AC. or DC ball bearing fully enclosed motor from Army surplus dynamotor. Purchaser to make simple changes and shaft extensions, detailed instructions and all parts supplied. Motor approximately 5,000 R.P.M. Ideal for tool-post grinder, flexible shaft tool, model drill press, saw Shipping weight 6 lbs.



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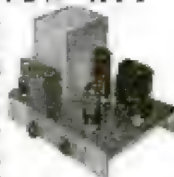
50 AMP. CIRCUIT BREAKER

No. 204. New General Electric 50 Amp., 220 Volt A.C. circuit breakers. Add postage for 4 lbs. **\$2.95**



HEATHKIT HIGH FIDELITY AMPLIFIER KIT

No. A2. A truly fine 110V. 60 cy transformer operated High Fidelity Amplifier Kit. Ideal for reproducing quality music at home, churches, mortuaries, outdoor gatherings, etc. Output over 10 watts. Complete with all tubes (push pull circuit) transformers, punched chassis and detailed assembly instructions. Shipping weight 20 lbs. High Fidelity 12" PM Speaker



\$14.95

for above **\$6.95**
Mahogany speaker cabinet size 14 1/2" x 14 1/2" x 8" for above speaker **8.75**

FM PUSH BUTTON TUNER

No. 224. Brand new ten push button tuning assembly from Army FM receiver. Contains 4 gang 100 MMF silver plated tuning condenser. Shipping weight 10 lbs.



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G.E. 1000 VOLT 350 MA

DYNAMOTOR



No. 213. An ideal dynamotor for mobile operation in taxi cabs, police cars, sound systems and amateur stations. Supplies above voltage from 12 Volts or 500V. at 350 MA from 6 Volts. Complete with starting relay, and fuses. New. Our Dynamotor A. Shipping weight 2 lbs.

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HEATHKIT PHOTO TIMER KIT

An electric photo-timer anyone can afford. Complete kit includes every part, all punched, formed, ready to assemble. Push button operation. Already calibrated from 1 to 45 seconds.



\$8.75

Has focusing switch, line cord and enlarger socket. Complete pictorial diagrams make assembly easy Shipping weight 4 lbs.

HEARING AID HEADPHONES



No. 216. Hearing aid type, comfortable, keeps out outside noise, one of the Army's best types. Add postage for 2 lbs.

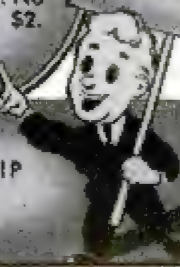
\$1.00

Give part number and description. Add postage for weight shown. No orders under \$2.

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WE WILL SHIP
C.O.D.



Amazing NEW TOY GUN



"Shoots" Like a Real Gun

ONLY \$1.00

INCLUDES 10,000 SHOTS

COMPLETELY SAFE

Here is the gun that will thrill every boy. When you pull the trigger, it cracks out like a real gun and smoke puffs out of the muzzle. The American Rangers Automatic is a quick acting, repeating pistol that never misses. It shoots 60 to 75 shots without re-loading. Looks like a real gun. Absolutely SAFE. Contains no explosives. Each gun comes boxed with 10,000 shots of smoke powder or enough ammunition to last a full year. This smoke powder is harmless. Will not hurt the eyes and may even be eaten. Only \$1.00 each or 3 guns for \$2.00. Only limited quantity available. Write for yours NOW.

SEND NO MONEY Try 10 Days - At Our Risk

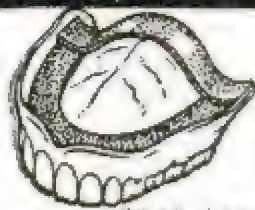
Just send name and address. On arrival deposit only \$1.00 plus C.O.D. postage for one gun or \$2.00 plus C.O.D. postage for three guns. If not completely satisfied return and your money refunded. Save money. If you send cash with order, we pay postage. Write TODAY! No foreign orders accepted.

SPECIALTIES MFG. CO., Dept. 508

1367 N. Sedgwick

Chicago 10, Ill.

PLASTI-LINER



Easy to Use Strips

ONE APPLICATION

Makes False Teeth Fit

For the Life of Your Plates

If your plates are loose and slip or hurt, use this amazing, pliable, non-porous strip to refit them yourself, for instant and permanent comfort. It's easy. Just lay the strip on your upper plate or lower plate, then bite and it molds perfectly. Hardens for lasting fit and comfort. Helps stop the embarrassment of slipping, rocking plates or the misery of sore gums. Eat anything and talk freely without fear your teeth will loosen. Ends forever the mess and bother of temporary applications that last only a few hours or months.

Easy to Re-Fit and Tighten False Teeth

PLASTI-LINER is tasteless and odorless. Won't injure your plate. Guaranteed to give satisfaction or your money back. Removable as per directions. Users say: "Until I used Plasti-Liner I used several kinds of liners without success. Now I can eat anything." H. H. M. "My plates are now better fitting than new." E. H. C.

At Drug Stores, or write us for PLASTI-LINER today.

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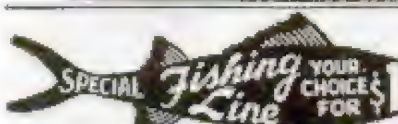
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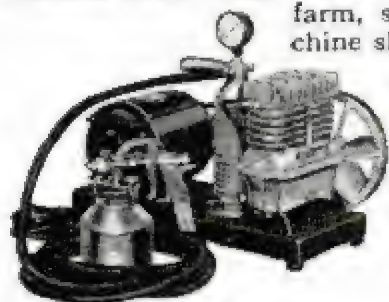
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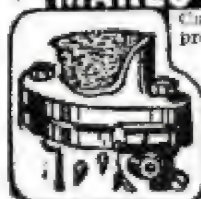
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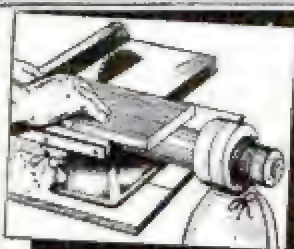
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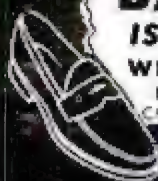
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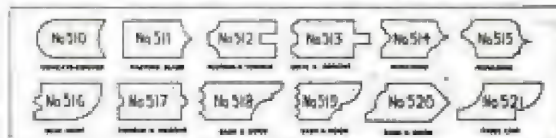
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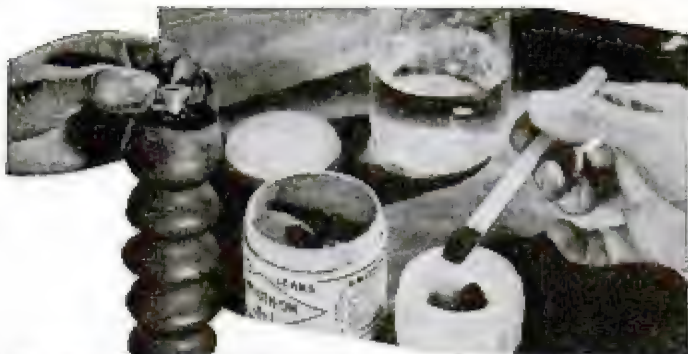


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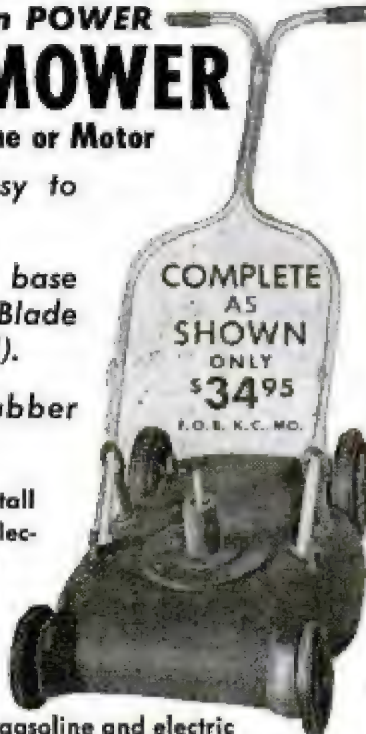
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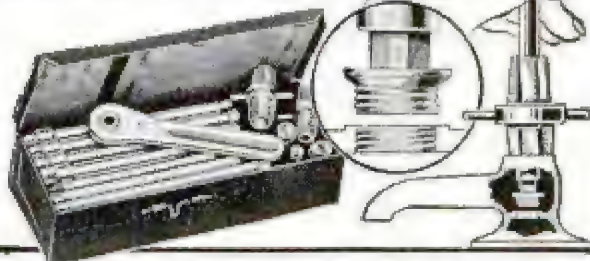
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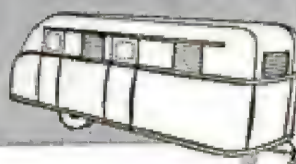
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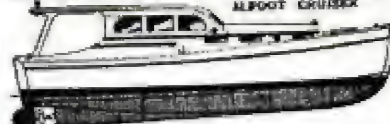


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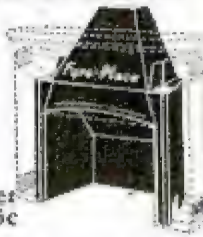
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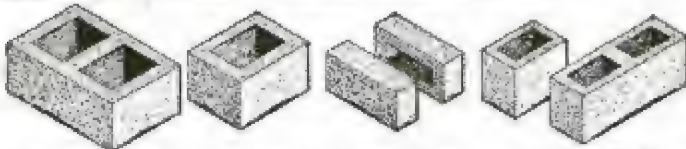
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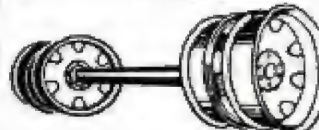
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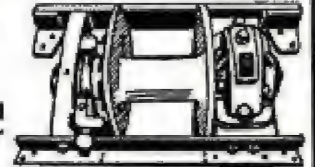


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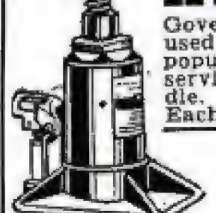
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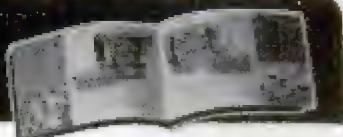
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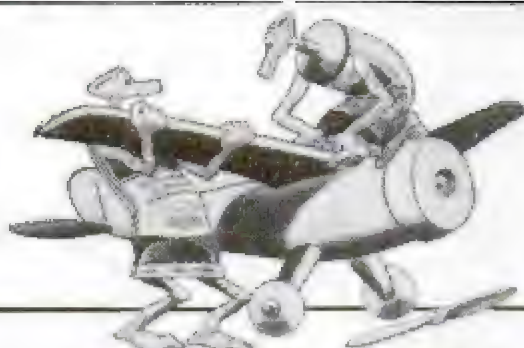
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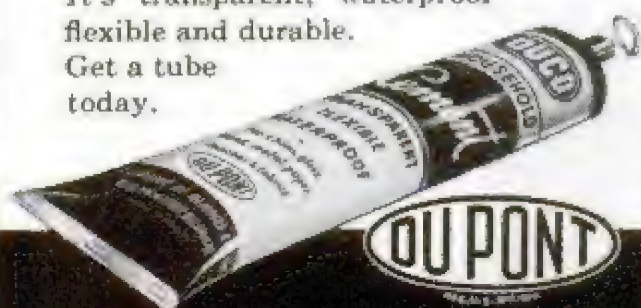
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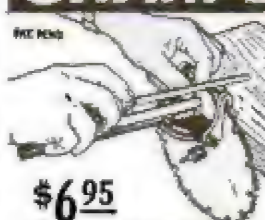
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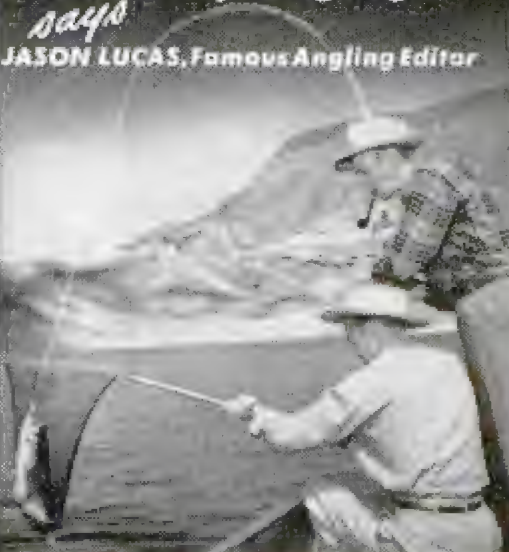
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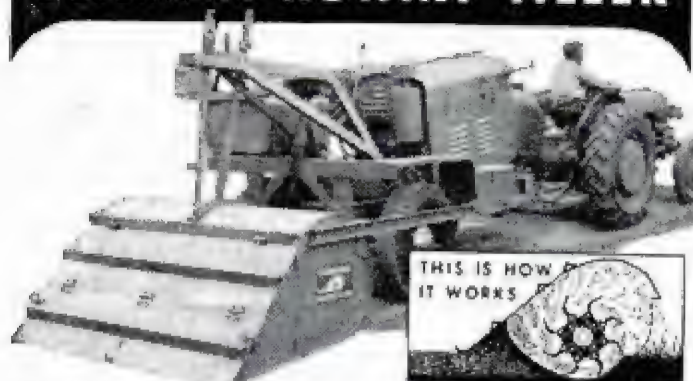
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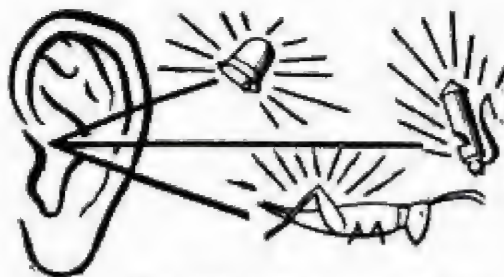
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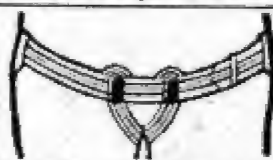


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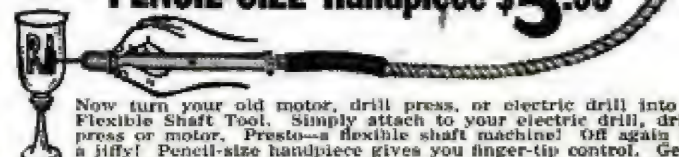
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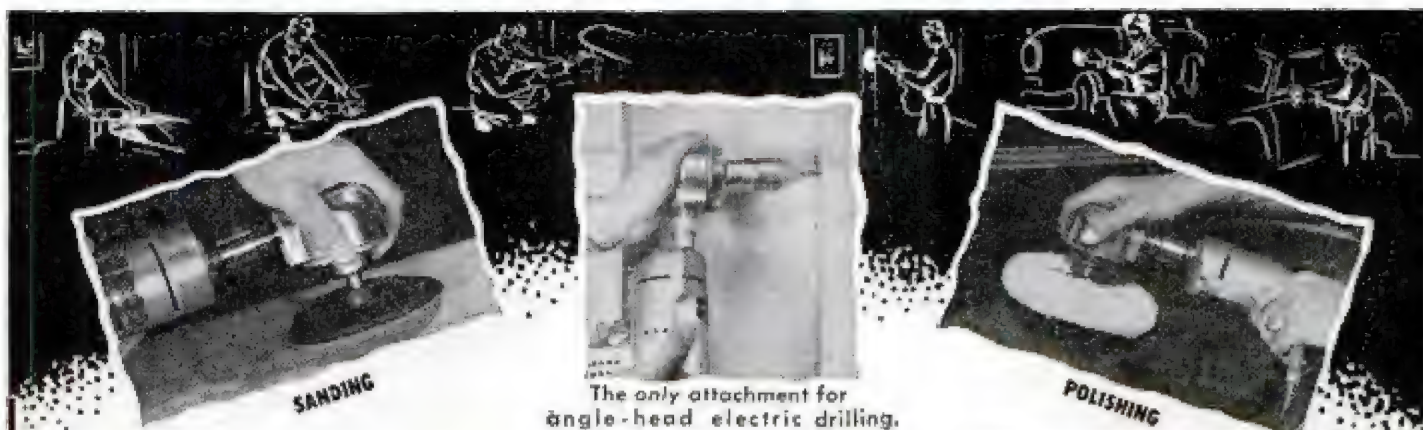
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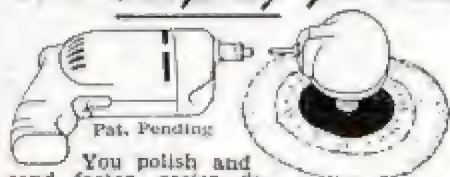
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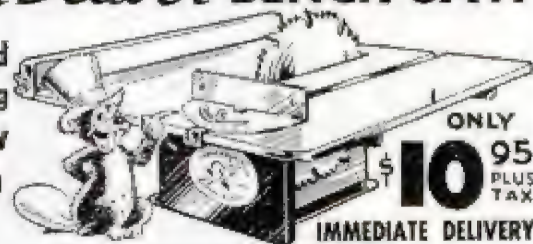
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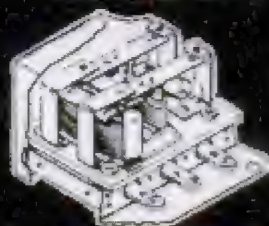
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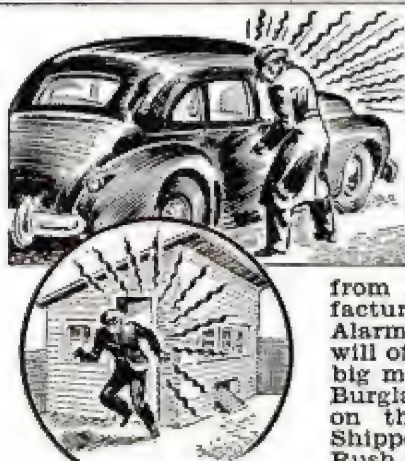
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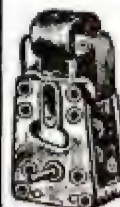
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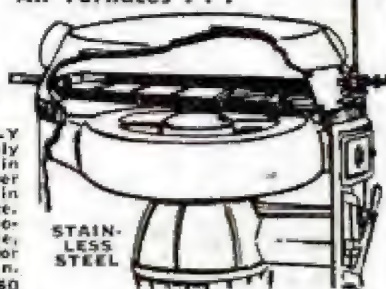
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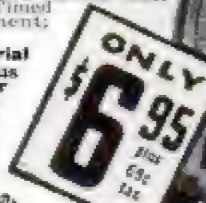
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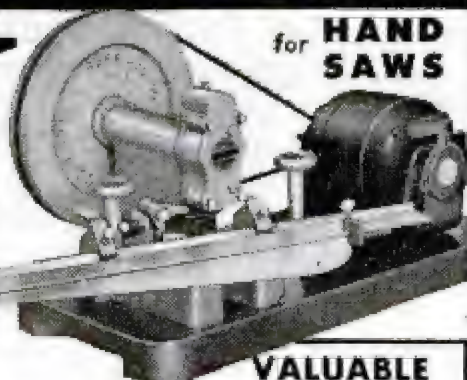
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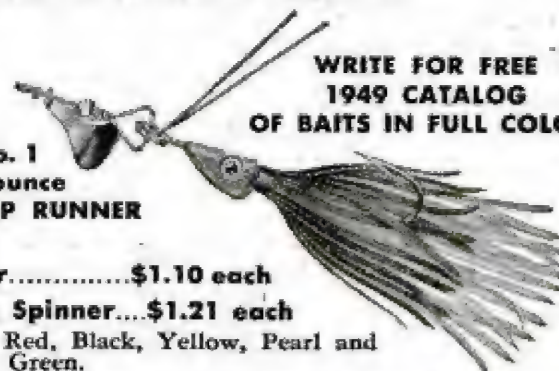
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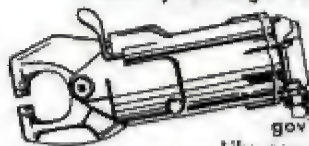
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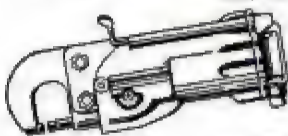
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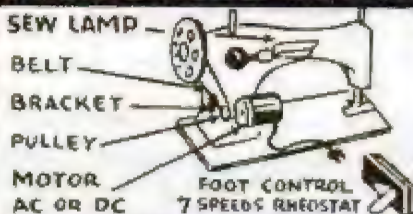
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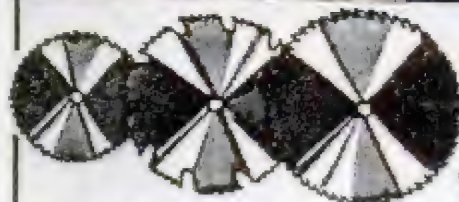
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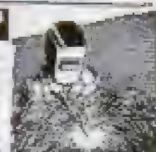
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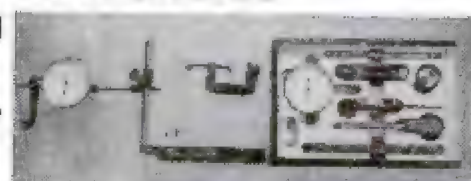
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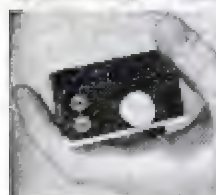
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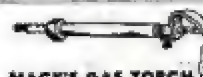
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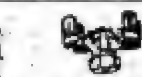


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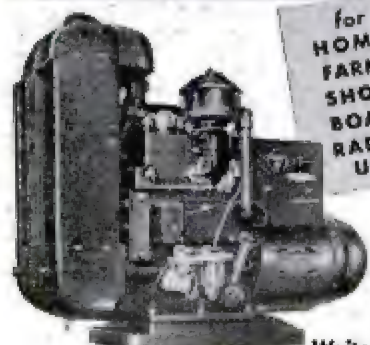
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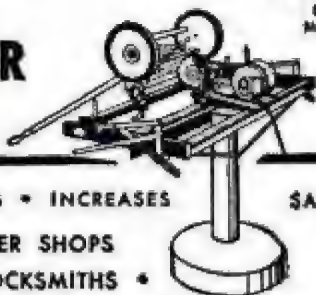
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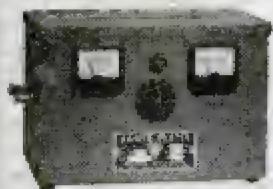
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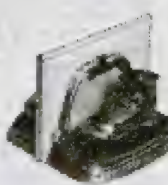
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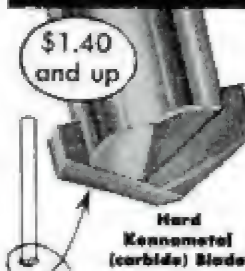
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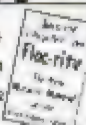
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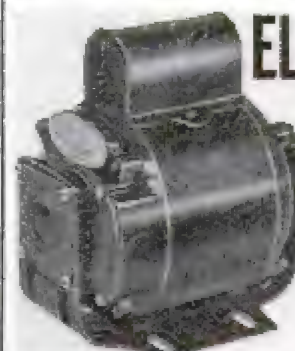
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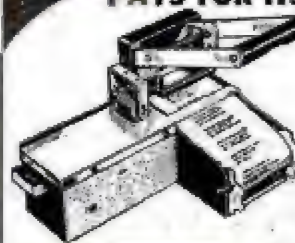
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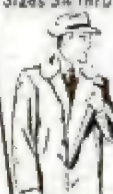
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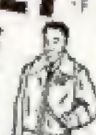
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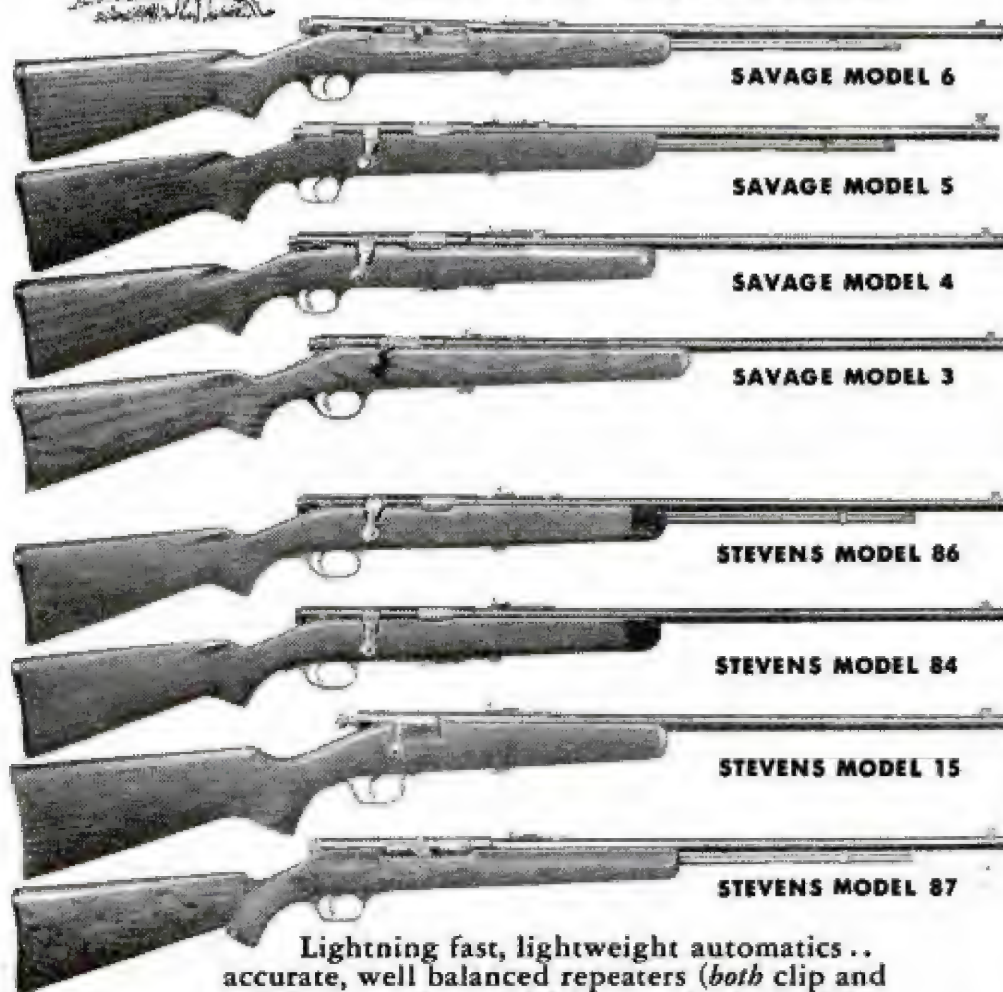
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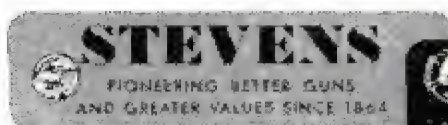
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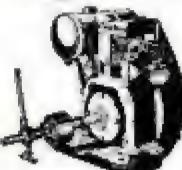
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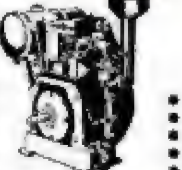
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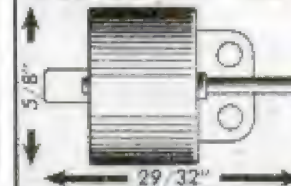
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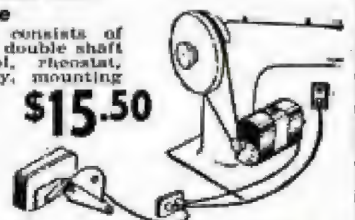
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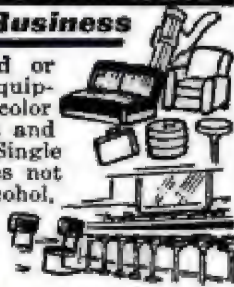
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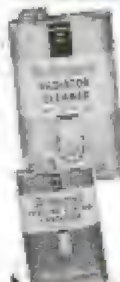
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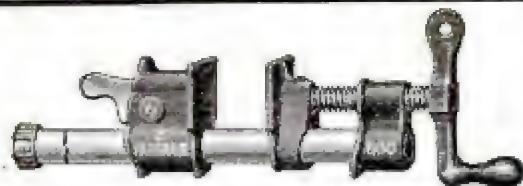
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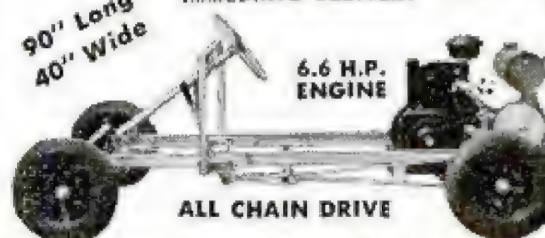
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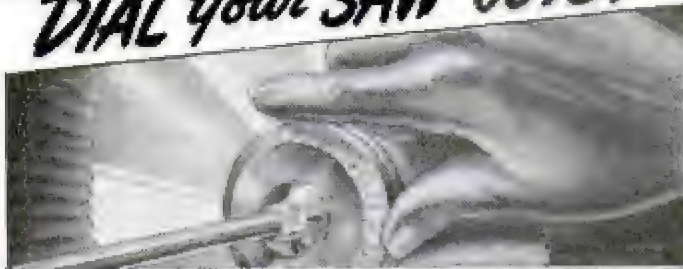
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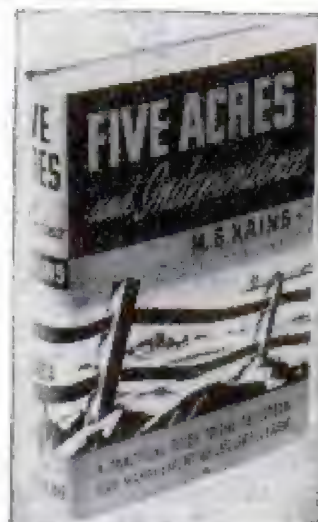
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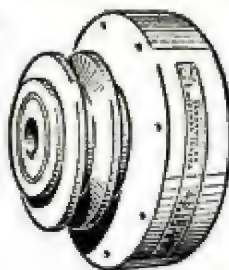
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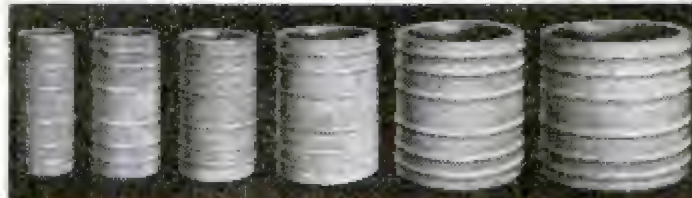
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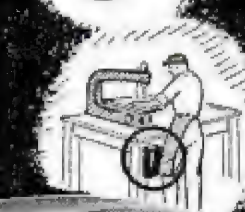
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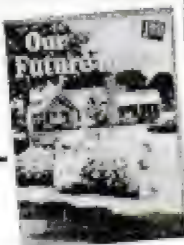
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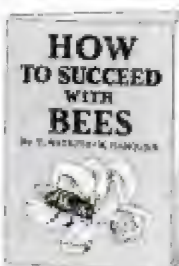
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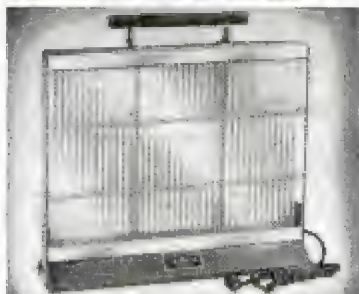
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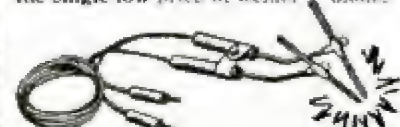
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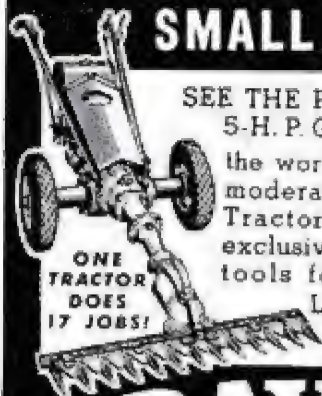
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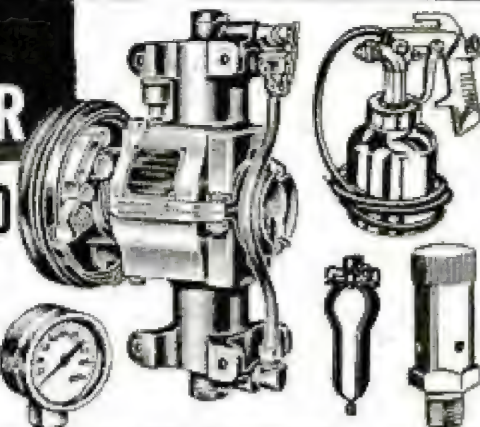
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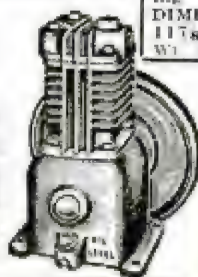


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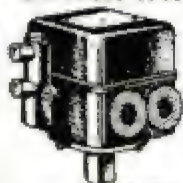
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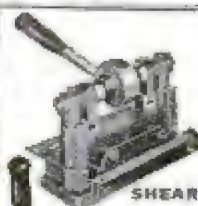
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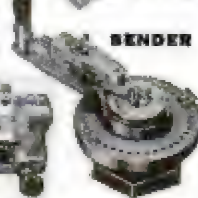
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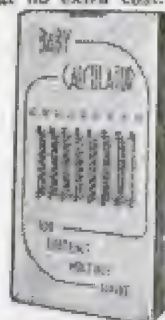
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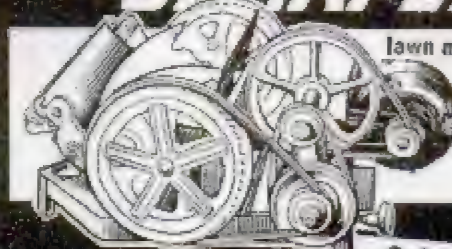
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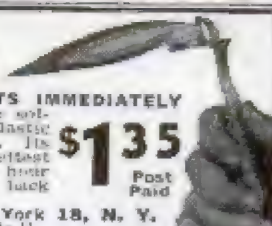
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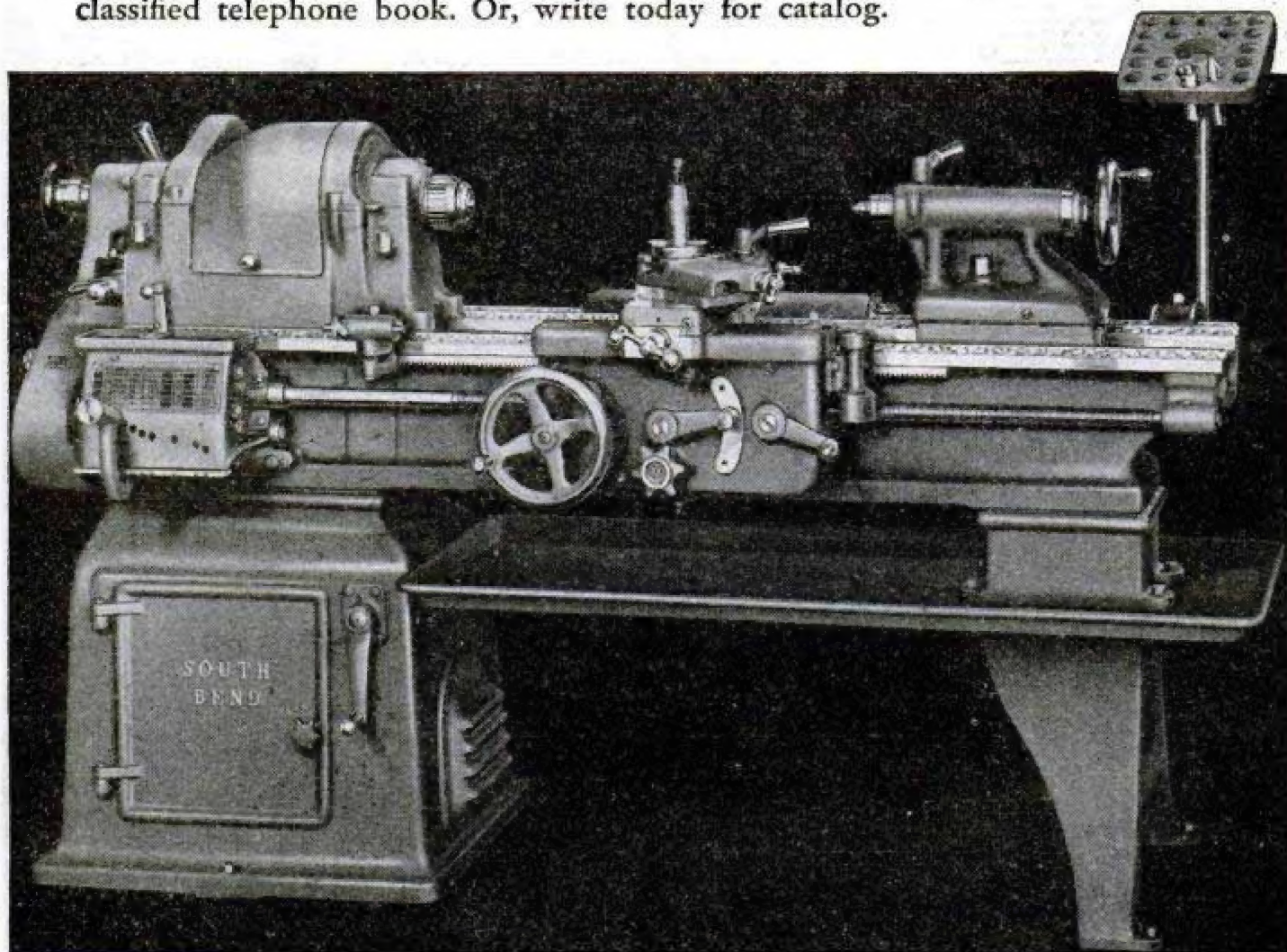
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